Vol 2 No 3 April/May 1985 $3*

A Gareth Powell Magazine

The Australian COMMODORE REVIEW

Ozisoft releases Datasoft range

Disk drives **Help for beginners**

Basic list sorting

Jumpman/Loderunner clinic

Looking after your digital pal

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commodore COMPUTER

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The Australian COMMODORE REVIEW

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Editorial

April was supposed to be different. Well, it is different. Gareth Powell, our Welsh publisher, has come up with a very good suggestion which we have endeavoured to put into action from this issue. Accompanying suitable articles you will find a help box entitled:- 'Especially for beginners'. These little additions are there to keep those of us with a bad memory for technical gibberish and those of us who have yet to come to terms with it, at ease with whatever terminology is mentioned in the article nearby.

In this manner we can cater for beginners without becoming simplistic or boring to our other readers. If you like this idea please let us know, if not, do likewise. I believe it is a further step toward making the Australian Commodore Review a better magazine.

In this month's issue you will also notice a few other less obvious cosmetic improvements. These are all part of our continuing plans to upgrade the magazine wherever possible.

Education is now a very popular use for home computers. We have recognised the need in this area and feel that the additional section in this issue will cope with the demands we have had for more articles on the subject. If all goes well, our education section will become a regular feature.

With all this shuffling and shifting going on about the place it may be easy for us to get sidetracked. However, with your continuing support I'm sure we'll keep on the right path. Two of our readers summed up the magazine's direction fairly well with these comments:-

"Australian Commodore Review ...seems to take a warmer, unreserved, friendly attitude." - John Hambley (A.C.T Commodore User Group).

". . .as my son says: 'unlike the others - there's hardly any crap'". - John Pointing.

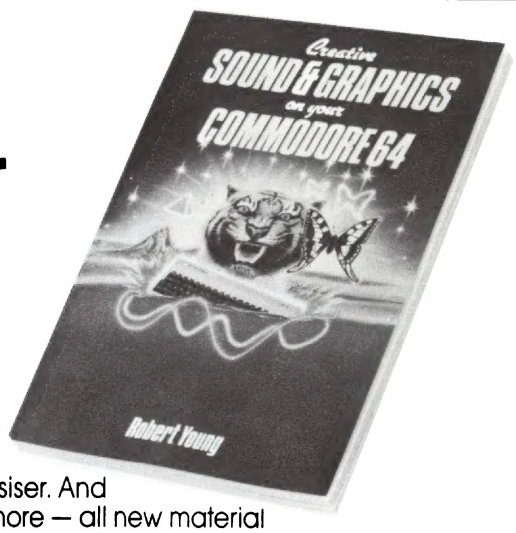
Well, that just about sums it up.

Warm, friendly, unreserved and as little 'crap' as possible. I hope you find that formula acceptable, because that is how we intend to stay.

Andrew Farrell

Andrew Farrell and Kit Richardson

If you're not through playing games on your Commodore 64, here are some more!



Here's the follow-up to our highly acclaimed first Australian Commodore 64 book. Now, "Creative Sound & Graphics on Your Commodore 64" shows you even more ways to explore the full potential of this mighty micro.

You'll see how to use PRINT, PEEK and POKE to create a host of exciting new games like:

Maze Muncher: Eat your way out of danger before the spooks eat you!

Safari: Fight your way back to your jungle camp, through wild beasts and worse!

Robot: Diffuse the bomb while it — and the seconds — tick away!

You'll find new ways to improve animation. How to make the most of your Commodore 64's sophisticated 3-voice-synthesiser. And there's much more — all new material from this brilliant young Australian programmer — all for just $15.95. Available from better booksellers and computer stores.

Another fine Australian computer book from:

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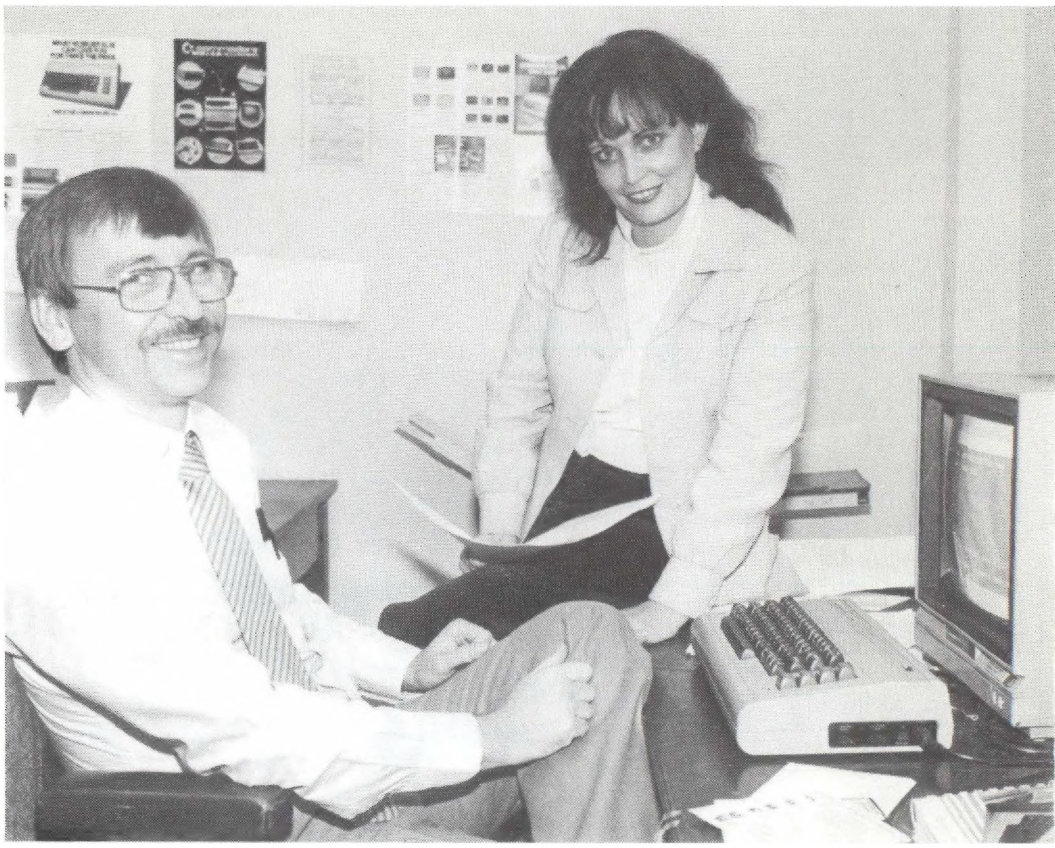
(Computer stores enquiries to Computer Reporting Services)

RAM RUMBLINGS

Government loan for Computer Tutor

John and Mary Anne Paynter



The Minister for Industry and Decentralisation and Small Business and Technology, Mr Eric Bedford, has approved the provision of a $120,000 loan to Computerized Tutorial Systems, of Gladesville, for the development of a full range of computer programs for Higher School Certificate students.

This was announced at the recent launching of a Maths Tutorial Series for the Commodore 64.

The loan, provided by the Advanced Technology Development Assistance Fund administered by the Department of Industrial Development and Decentralisation, will enable Computerized Tutorial Systems to broaden its range of educational software, which is being marketed under the Computer Tutor label.

The Computer Tutor software range is the brainchild of Sydney psychologists John and Mary Ann Paynter.

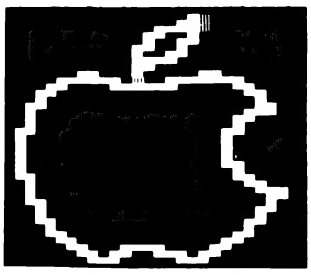
The husband and wife team borrowed a Commodore 64 computer from Commodore Business Machines two years ago and set about writing programs containing a vital element never before applied to educational software - the psychology of learning.

"Most educational software is produced by teachers or programmers, or a combination of the two," says John.

"We have opted for a team approach that includes a psychologist. The teacher supplies the original content, the programmer provides the technical expertise that makes the programs work effectively, while the psychologist is responsible for the program design.

"The result is an inexpensive private coaching program that can be used equally well in the classroom or in the home."

Computer Tutor programs are available direct from Computerized Tutorial Systems on (02) 816 3178 or through Entertainment and Computer Products Pty Ltd, of Mosman, (02) 960 4222.



Have you seen the other Gareth Powell Computer Magazine ?

The Australian Apple Review

Available from newsagents and computer stores, or by direct subscription ($18 for six issues, $36 for 12 issues from

Gareth Powell Pty Ltd
Top Rear, 4 Carrington Rd, Randwick, NSW 2031

New Products

Commodore announces mid-year release of PC-10

Commodore will release its new IBM PC compatible business computer, the PC-10, in June this year.

The PC-10 is fully compatible with the IBM PC and is equal to the IBM unit in performance.

Commodore has an existing extensive and highly trained dealer network which will give the new machine market prominence.

The PC-10 will be priced substantially below the IBM PC and other compatibles.

Commodore has carefully backed up its claim of full IBM compatibility. IBM versions of Lotus 1-2-3, dBASE III, Multiplan, Wordstar, Symphony, Flight Simulator and other popular programs all run on the PC-10 without any hitches.

The PC-10 also accepts the range of hardware add-ons designed for the IBM PC. They can be plugged straight in to the PC-10's four expansion slots.

The standard configuration for the PC-10 is two 360KB floppy disks; 256K RAM expandable to 610K; built-in Centronics and RS232 interfaces; and four expansion slots.

Commodore will also release a hard disk PC compatible unit in August this year. Called the PC-20, this unit will have a 10MB hard disk as well as one 360K floppy.

Commodore PC 10

Inexpensive Autoanswer Modem

Avtek Electronics have introduced a low cost hardware "autoanswer" facility to their popular MultiModem. This facility enables the modem to detect when the phone is ringing and to switch into "receiving" mode, sending out a carrier. This feature is essential when a computer and modem are to receive material unattended.

While a few computers have powerful (and expensive) software that does all this from the computer, most don't, says Phil Gleeson of Avtek. "We hope that our autoanswer MultiModem will provide the low cost answer that many businesses and individuals are looking for."

According to Phil, autoanswer is a great time and cost saver. Many businesses cannot afford to have their lines locked up during the day with modem data transfer. With autoanswer facility, they only need to leave the computer and modem on at night. The data can be sent to them while the phone lines are not tied up with conversations.

For interstate and long distance data transfer there is also the cost saving to be considered. With the growing use of modems in country areas, this is an important consideration.

For further information contact: Phil Gleeson, Avtek Electronics Ph: (02) 427 6688.

Skai 64 disk drive - new from Japan

Developed from the ground up, the Skai 64 disk drive plugs directly into the standard port on the Commodore 64. Porchester Computers, the importers, say the Skai 64 is smaller, and runs significantly cooler than the Commodore 1541. In addition to this it is faster. Using the latest in direct drive disk technology, it was designed to operate as close as

possible to the Commodore 1541 disk unit.

Apart from the obvious differences in appearance the unit behaves just like the 1541. It uses the same connectors and leads, and allows expansion to a printer from the rear of the disk unit. The main noticeable difference is that it is faster (about 25%). Porchester Computers say that many different types of game and program have been tested by their dealers and customers on the Skai 64, and so far all have run successfully.

With a recommended retail price of $349 including tax, and a full six months warranty, it is expected that this unit will sell very well in the Australian and New Zealand markets.

Porchester have also just announced the imminent release of a 100 characters per second dot matrix printer for the Commodore 64. Full details are not yet available but it will link up in the same way as the Commodore printer, and will run high-res graphics dumps from the screen to the printer. It is expected to retail for around $395 including tax. Porchester computers have the Australian and New .Zealand distribution for both products. For further information telephone (03) 417 6999.

Business Section

Commodore expects another big year

Commodore Business Machines has forecast another boom year for its range of home computers, and announced a major expansion of its role in the business machines area.

Managing Director of Commodore in Australia, Mr Nigel Shepherd, says the company has moved to consolidate its position as the top home computer marketer in the world.

And it is planning additions to its range of business computers during 1985.

He said Commodore International had reported sales of US$583 million worldwide for the six months to December 1984.

Half year results

"The half-yearly results are particularly pleasing in the light of market pressures, international currency fluctuations and Commodore's own long-term planning," Mr Shepherd says.

"Those results were achieved despite enormous currency fluctuations, which reduced the real performance when converted to US$ because of the strength of the American dollar against other cur - rencies, particularly those in Europe.

"In addition, our international sales reflected an increased share of the available market and were achieved in spite of a reduction in the average selling price of home computers.

"As anticipated, the growth in the firsttime user market - the market under $500 - has slowed down, but it was unrealistic to believe that it could continue to grow at its previous pace forever.

"But it is still growing and the pace can be expected to pick up again in the next few months.

"The pause in the growth rate simply reflects a sophistication of the market, which Commodore is now addressing.

Subtle changes

"While the market for home computers overall has slowed, there are also subtle changes occurring.

"Today's computer buyers include many people who are purchasing their second computer.

"They are beginning to seek more sophisticated home computers to make use of their expanding knowledge of computer capabilities."

Mr Shepherd says Commodore is already moving to cover this sector of the market.

"We are addressing the various market sectors that have become apparent in the last 12 months," he says.

The first move in Commodore's campaign was the introduction of the Com-modore 16 home computer, a replacement for the VIC-20, which has already established a strong market for itself.

The Commodore 16 is an ideal machine for the first time user and in Australia is being packaged with tutorial software as a "Learner Pack".

Flagship

Mr Shepherd says the Commodore 64 is still the flagship of the Commodore range, and is setting sales records in Australia along with the rest of the world.

The introduction of the Plus 4 computer is catering for the more serious home computer users.

Mr Shepherd says the Plus/4, with four business-type software programs built in, is invaluable for home users to prepare reports, write letters, draw graphs or complete financial analyses.

Commodore will also add to its business systems computer range, around June this year, an IBM PC compatible computer.

The Commodore PC will be completely priced around 15% lower than the IBM PC equivalent.

"That's only the start of our expansion," Mr Shepherd says.

"We're growing up with our users.

"Having established a strong reputation with computer users we are aiming to provide them with Commodores they can keep on using as they become more sophisticated in their use of computers.

"We have prepared ourselves for a much more aggressive marketplace and for our expansion into new areas.

"And we are also constantly making business decisions to protect our current market share."

Mr Shepherd says Commodore will remain the No 1 selling home computer in the world.

Wordcraft and Laserjet join forces

The new Hewlett-Packard Laserjet printer, together with Wordcraft, could provide the answer to all the printing problems of business.

The main advantages of the new system are, according to Personal Computer Services Pty Ltd:

Speed: Wordcraft can drive the Laserjet at its maximum speed, approximately 300 characters per second, for all draft printing.

Quality: In draft mode, the Laserjet produces output of better quality than the best daisy wheel printers. In multi-font mode, with true proportional spacing and justification controlled by Wordcraft, the Laserjet can produce perfect "camera-ready" copy in up to eight different fonts.

Response time: Anyone who has anything to do with ordering print will realise the enormous advantages that come with having a typeset-quality system in-house. Now, directly from a standard microcomputer running Wordcraft, output is produced ready for printing. No longer does text have to be prepared on a typewriter, then retyped all over again by the typesetting bureau. No longer are special arrangements needed to get word-processed text into a typesetter - the whole system is in house.

The system offers a variety of typestyles including the following: Helvetica Bold in 14 point, Times Roman Medium in 10 point, Times Roman bold in 10 point, Times Roman italic in 10 point, Times Roman Light in 10 point.

Different typefaces can be mixed together in any text to produce perfectly justified proportionally spaced output.

For more information:

Personal Computer Services Pty Ltd, (02) 923 2899.

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When You've Invested In A Commodore 64

You've Invested In Your Kids Education.

At last, the world's number one selling computer in a pack. The Commodore 64 now available in a family pack at a very affordable family price. $700 value for just $499. You get the powerful Commodore 64, plus datacassette and joystick, four software programs: Money Manager, An Arcade Game, Rolf Harris Picture Builder and Introduction To Basic (a teach yourself program). A great gift for the whole family who work and play together.

commodore COMPUTER

Keeping up with you.

Contact your nearest Commodore dealer or Commodore Business Machines:
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BMSCC31

HOT STUFF

by Andrew Farrell

My humble office is currently hidden beneath piles of new software all begging to be reviewed. Well, I only found time to load up a few, there were so many adventures that take hours to play. Some will have fuller reviews next month, but for the moment here they are - a few of them are nothing short of brilliant.

Eureka - a 25,000 pound mystery

Anyone who has the patience, time and self discipline to write 250 kilobytes of adventure deserves some kind of award. However, anyone who actually plays such a mammoth adventure and successfully gets through deserves a lot more. How about a cool 25,000 pounds. You have until 31 December so you'd better be quick. There are five scenarios to explore including Prehistoric Europe, Roman Italy, Arthurian Britain, wartime Germany and finally the modern Caribbean.

Each of the adventures contains a clue to a mystery code. The answers to the riddles in the accompanying booklet lie within the programs and you can decipher the code into a UK telephone number using chapter six in the booklet. Dial the number, answer a simple question and you get the 25,000 pound reward.

Here's the overall scenario. The Temporal Talisman is an ancient artifact found on the moon by the Apollo XVII mission, but whose existence was a closely guarded secret. The Talisman, a cube of crystal 15" on each side, resisted all attempts at analysis until it was subjected to the intense beams of the SHIVA Fusion Project lasers. The Talisman shattered under the beams and each of its corners vanished.

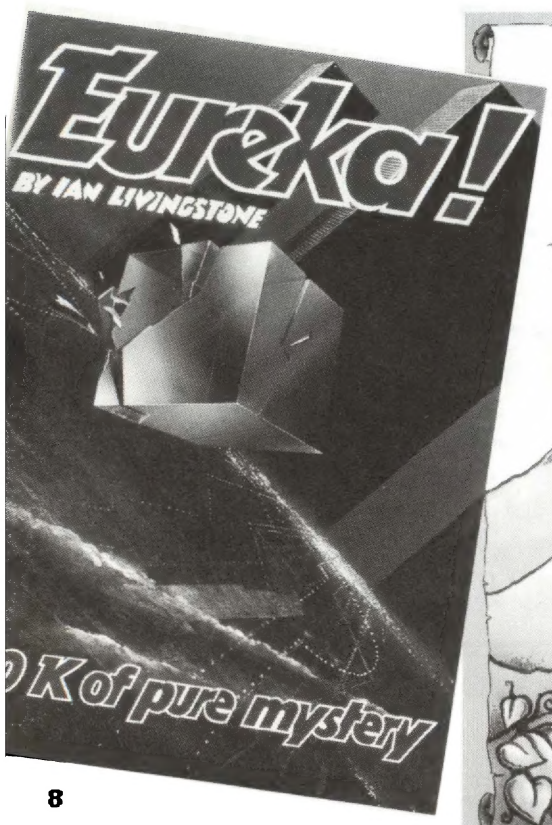
Three of the missing pieces were found several days later in various countries. In each case the pieces were traced by the peculiar radio frequencies they emit - but the other five are still missing. Coincidentally, a series of strong moonquakes have racked the moon.

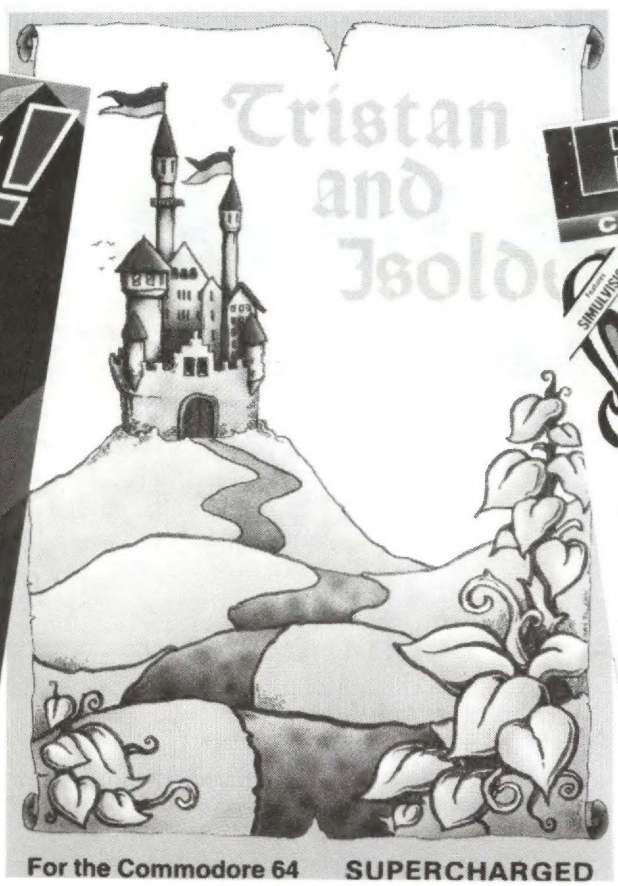
A noted physicist believes that these quakes are a direct result of the Talisman being damaged and that in time the moon would explode, sending thou-sands of massive meteorites crashing to the earth! This disaster must be averted, and you have the chance to do so by piecing the Talisman back together. Only a few months remain before the earth is destroyed.

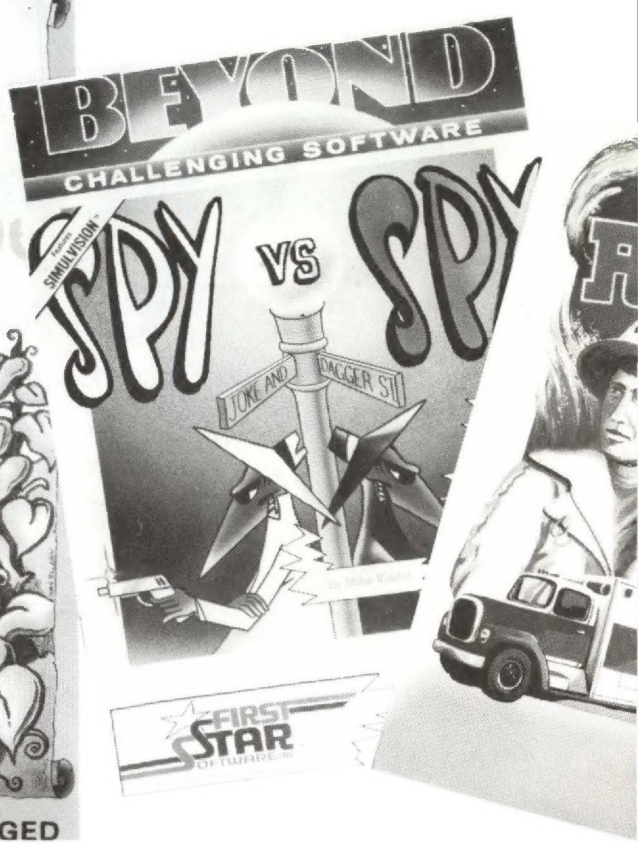
Well, it all sounds very interesting, so watch out for the full review next month. Our review copy came from Ozi Soft on cassette.

Boulder Dash

This game is exactly what it sounds. In a large underground area,







you must dodge falling rocks and various nasties to collect gleaming jewels scattered about the place. A fair deal of thought has to go into some moves as a step in the wrong direction can send a large landslide crashing on top of you.

Rockford, a short spindly figure, dashes about the screen collecting the diamonds. After all have been found an escape tunnel appears and you may proceed to the next level. Every four levels there is a playable intermission. Entertaining, with good graphics. Our review copy came from Ozi Soft on cassette.

Tristan and Isolde

An arcade/adventure type game based on the famous Bavarian legend of the name set in the middle ages. The package comes complete with a poster that explains the legend in full with the help of a few pictures of a busty Isolde and a goofy looking Tristan.

In play the adventure is a fun variation on the standard concept. The screen displays a perspective view of your correct position and Tristan, our hero, is animated as he marches into and out of each room. Various objects appear on the walls, all of which are useful at the right time. Some are helpful in combating the wumpiditis, whilst others give you special powers.

Neat graphics and music, great for younger kids. Our review copy came from Ozi Soft on tape.

Silicon Warrior

The year is 2084 (first criterion for a science fiction game) and the Silicon Valley is enveloped in a conflict of the fiercest magnitude. A competition to write a computer program that will unravel the mysteries of the universe. No small task, but small enough to turn a game with the help of some real programmers at Epyx.

Cut the fancy descriptions, this one really is a lot simpler than it sounds. In fact it is just a glorified version of Os and Xs. A super sonic, auto bionic version with turbo charging and lots of bells and whistles. The sort of thing you might expect someone out of Tron to play.

Once again, I'd have to say this one is only for the younger kids. Imaginative graphics, a good variation on an old theme. Our review copy came from CBS software, who incidentally are now called ECP software.

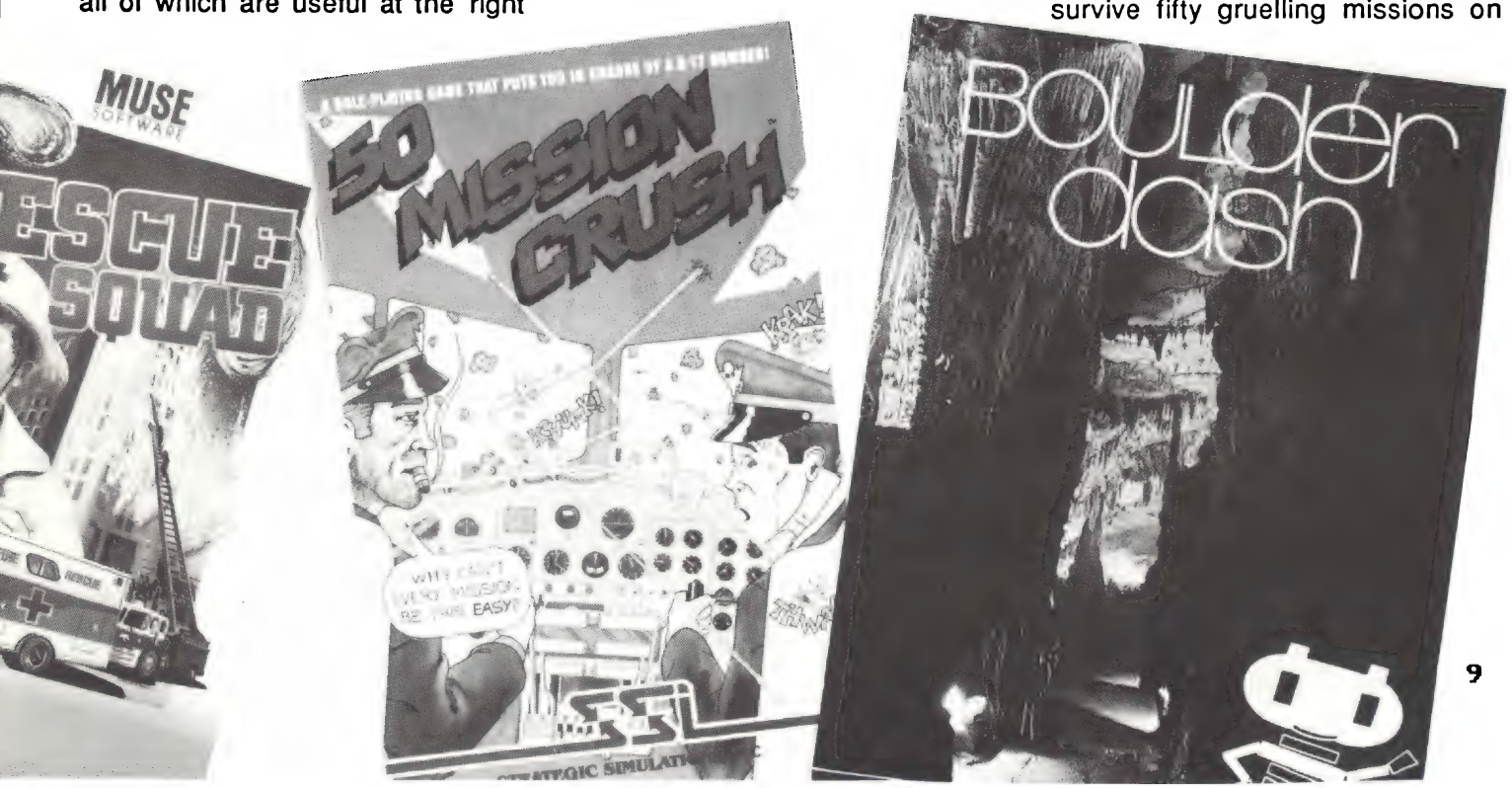
Rescue Squad

At last a game where you don't shoot things, destroy aliens or bomb buildings. Its let's be a hero time. Scene One: Race your ambulance to the scene of a raging fire, avoiding the city traffic that seems oblivious of your presence. Scene Two: Catch all the falling tenants as they jump out of their burning apartment windows. Some of them look rather charred, but I'm sure they'll live. Also watch out for falling pot plants. Once you get hit by three of them you progress to Scene Three.

A fire truck arrives on the scene and up the ladder you go. Now you must rescue the trapped residents, avoiding the fireballs that move about the hallways. Only an asbestos jacket will make you less prone to the effects of the fireballs. Once again a fun game for the simple minded. Some very catchy music and creative graphics. Our review copy came from Jedco Software on disk.

50 Mission Crush

Now for a change to the other extreme, also from the same software company, 50 Mission Crush. As a B-17 Pilot, you must endeavour to survive fifty gruelling missions on



HOT STUFF

bombing runs across France and Germany. Everything about the game is based on history.

As a simulation you have to pay special attention to detail. Select your fuel requirements and payload, control your flight altitudes, and keep on-board fires at bay. There are also attacking fighter planes to ward off and heavy flak from ground bases. Great if you're a war fanatic, with all the regular features you'd expect from this type of game.

Spy vs Spy

This is my kind of game. From the creators of MAD magazine come those familiar secret agents, dressed in black and white. Their antics for supremacy as they battle it out on the printed page have amused many millions of people for years. Well, folks, now you can see them on your screen, getting up to their old tricks.

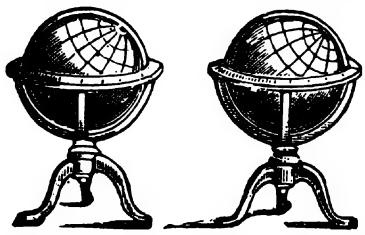
The game allows for one or two players to pit themselves against their opponent using every weapon at their disposal to make life difficult for the opposition. Everything from booby-trapped doors to time bombs, water buckets and springs. Simulvision, a complex split screen technique, allows both players to appear on the screen simultaneously.

Your objective is to escape the embassy with the Top Secret Briefcase, passport, money, plans and the keys. Hand to hand combat is not uncommon as the players struggle over each object. The embassy size can be varied, right up to multi-level buildings with ladders and hidden trap doors.

This one is a real winner, very entertaining and a laugh a minute. Highly recommended to MAD fans, and everyone else too. Our review copy came from Ozi Soft - full checkout next month.

FOR BEGINNERS

Life, the Universe and Your Commodore 64 - PART I



by Andrew Farrell

Here it is folks, as promised last month. A guide to end all guides. The answer to every question as well as the big one. An introduction to personal computing, BASIC programming and the joys of owning a Commodore 64. This month we will start by talking about BASIC and discover a few other important ground rules.

BASIC. It is hard to imagine that this humble computer language, so heavily criticised by some, was the spark that really got the whole home computer revolution off the ground. A way to converse with your machine that was, when compared to other languages of the day, very easy to use. All the commands are close to English and actually do something near to what they sound like they might do.

BASIC stands for Beginners All Purpose Symbolic Instruction Code. A bit of a mouthful, but at least that gives you some idea of the purpose of it. It was designed for beginners to do whatever they so desired and most of all to make computer programming easier.

Whether or not it succeeded is debatable. Some believe that other languages have a lot more to offer, but when it comes to the bare facts, BASIC stands unchallenged. After all, nearly every home computer has BASIC built into it, ready for use. The Commodore 64 is no exception and whilst it is not essential to know how to program in order to use your computer, it will certainly give you a better understanding of what's going on inside that misty grey plastic box.

Let's start by discussing some of the absolute ground level principles of a computer. Firstly, what is a computer? Is a calculator a computer? Does the new General Electric Iron qualify as an iron? The manufacturer would certainly have some think so.

Rams and Roms

No doubt you have seen these two intimidating words many a time. They both refer to a certain part of the innards of your computer. Small pieces of silicon muscle designed for a specific purpose. RAM stands for Random Access Memory. This type of storage is like the working space of the computer. A giant football field waiting to be filled, a vast desert expanse.

It is hard to impress that memory is like space when it takes up so little physical room. Random Access Memory may be changed or modified at will. It is volatile, requiring constant energy to maintain what is stored within. The slightest variation or upset in its life giving source will render all that is stored within lost for - ever. That is where ROM has the dist - inctive advantage of being more permanent, but a lot more difficult to modify.

In most computers the ROM or Read Only Memory contains the Operating System or built in BASIC

language. The operating system is a program dedicated to managing the computer's operation at the most basic level. The keyboard, screen and any connected peripherals are all under the control of the operating system. Most home computers combine the operating system and built in language so that they are indistinguishable. Or simply, they are just one big program.

This giant program is written in Assembly language and stored in the computer in binary form. Binary is the only thing that a computer can really understand. At the heart of everything that goes on is a very important chip called the microprocessor. It understands simple instructions triggered by simple electronic pulses. Each instruction actually consists of a series of pulses which are either on or off, high or low.

These pulses may be represented in a more intelligible form as ones and zero's. The ones and zeros are then grouped into eights. Each of these ones or zeros is called a BIT, and eight of them together is called a byte. Inside your Commodore 64 there are 64,000 bytes of RAM to store things in, and around 16,000 bytes of ROM containing the built in BASIC. In practical terms that is quite a lot of space.

Let's revise for a moment. Inside our computer we have a large program that lets us converse with the computer in an understandable manner. This program is written in binary, the computer's native tongue, and is very difficult for humans to understand. It is stored in ROM and uses RAM as a work area.

We'll discuss various aspects of that last paragraph in more detail later on. For now, let's take a closer look at BASIC.

BASICally speaking..

Even if you never want to learn to program you will find that there are a small group of commands that must be learnt just to use your computer. These cover operations such as LOADing software, using the disk drive or printer and general housekeeping. Your computer can also be used as a powerful calculator.

Type this and press RETURN

```
PRINT 6*7
```

The answer 42 will appear. The print command tells the computer to print what comes next on the screen. In this case we gave it a small problem to work out which it evaluated and gave an answer to. Try a few others - remember that the computer does not have a divide or multiply sign so we use the '*' and '/' signs instead.

```
PRINT 5*9546

PRINT 100/19

PRINT 12*6+4-345/2

PRINT 45*SIN(1.2)+COS(3)
```

As you can see it is possible to enter fairly complex questions. In a program environment we can use the computer to calculate even more difficult sums. But computing isn't just about mathematics. Computers can also crunch words and letters. Try this one:

```
N$="FRED"

PRINT N$
```

Once again we have asked the computer to print something. It doesn't seem to make much sense, but if all went well and you didn't make any typing errors then the word 'FRED' would have appeared below the last thing you typed. In this example the computer had stored the word 'FRED' in memory and it will stay there until we erase it or turn the computer off. So, computers can also work with words or letters. In order to group all the symbols togethor that a computer can produce we call them characters. In all the Commodore 64 can produce some 512 different characters.

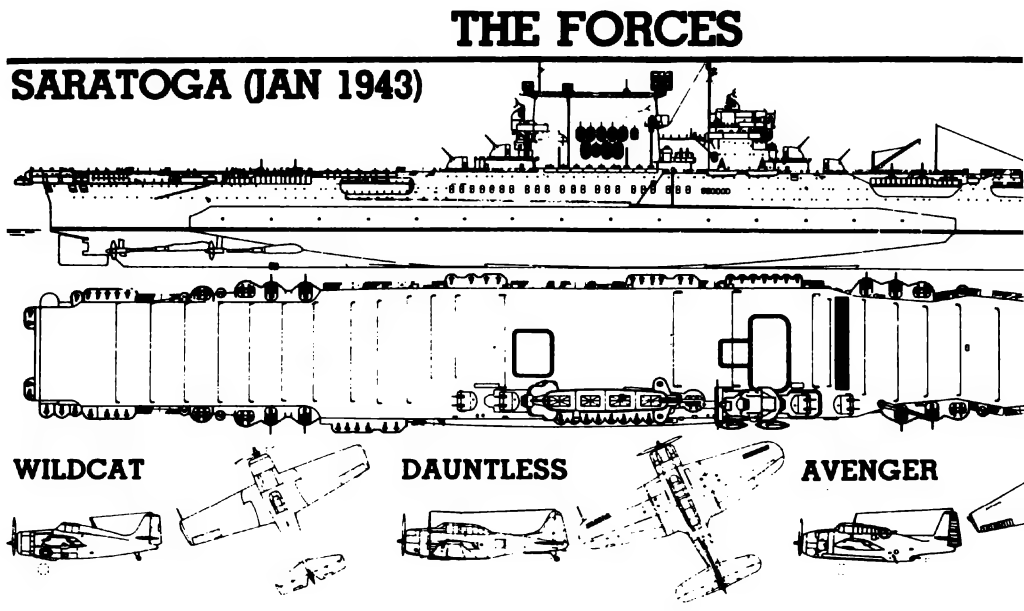
You may have noticed some of these on the lower face of the keys on the keyboard. These are called graphic symbols. We can print them on the screen or even design our own. So a computer can also work with graphics, in different colours and shapes. There is one more thing you'll discover your Commodore 64 can do and that is make sounds or music.

Numbers, letters, graphics and sound. The four building blocks that programs are made out of. No doubt you have seen the last two in many games, but have you ever thought for a moment how much number crunching is going on, behind what you can see on the screen, to make the game work?

More about the mysteries inside the 64 next month.

Adventurers' Corner Carriers

by Graham Cousens



Sometimes it's hard to be a reviewer. How can you possibly say anything unkind about a program that's brilliantly constructed, complex enough never to be dull, ranges instantly from the big picture to the smallest detail and back again, is well documented and relatively easy to learn?

Particularly as a patriotic Aussie, how can one not enthuse about such a technically admirable local product?

On the other hand, how can you be effusive about a program that, having tried once, you have not the slightest desire to run again?

It all comes back to the old critic's dilemma: to be objective or subjective.

Let's be objective first and subjective later.

Pearl Harbour and the Coral Sea

Carriers At War is an amazingly good adaptation of a war game to a microcomputer – or rather war **games**, since this one program gives you the opportunity to fight the battles of Pearl Harbour, the Coral Sea, Midway, the Eastern Solomons, Santa Cruz or the Philippine Sea.

All these have scenarios built in. If that isn't enough variety, the manual tells you how to construct your own scenario for the Raid on Ceylon. And if you're really dedicated the same instructions let you create your own scenario from scratch.

After that you can start to get into the subtleties of the game, using one of the 32 – repeat 32 – menus. There are action menus, information menus, single function menus and even branch menus that show you the way to other menus.

Changing the ground rules

Or, if you like, you can change some of the ground rules. The manual even gives some suggestions. For example what difference will it make to Pearl Harbour if the US forces **expect** the attack – or if they have more forces in Hawaii?

The game proceeds logically and clearly. Players (either one against the computer, two playing each other, or many players taking the roles of generals for each country) can consult a strategic map of the whole battlefield or tactical maps of specific areas. They can consult a weather map (critical to the outcome of battles), maps showing location of forces, any details known of enemy forces, details of your own fleet's strength and so on.

Operations are specified in great detail, from fuelling and arming the aircraft on carriers to selecting targets and launching strikes.

All this time the computer is handling the parameters outside your control, from the weather to submarine activity, in a virtuoso display that one can only wonder at.

The designers themselves say that the "80K of crushed machine code" (sounds cruel) that drives the game does so much that even they "are no longer certain exactly how some things happen".

It's easy to believe.

The manual and supporting documentation are excellent, down to details of all Japanese and Allied aircraft of the Pacific War and a lengthy bibliography.

There's evidence of careful thought for the customer, too, with the package even providing gummed labels for the back-up disks (you can copy the copy the master disk once before the built in copy program self-destructs – some concession to the anti-protection gang).

objective verdict One of the most thoroughly-researched and well-constructed super-adventure-games on the market. Australia can be proud of it.

Now let's get subjective. I am not a war game enthusiast. It's not that I've got more against war than the next man, it's just the complexity of detail that is bread and butter to the war game afficionado doesn't fascinate me.

But a chess game, with all its near-infinite variability, seems comfortably finite compared to the range of options behind every move of Carriers At War.

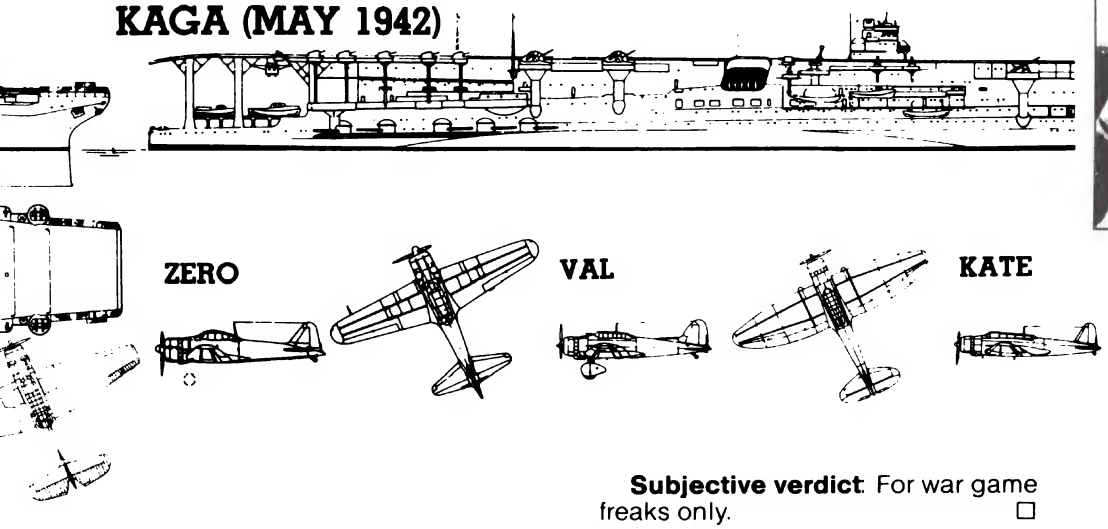
What's the weather? Where are your bases? The enemy's bases? Weapon allocation? Damage statistics? Firing accuracy? Base facilities?

at War

Ship vulnerability? And so on and so on and so on.

For a non-war-gamer it's all too much.

For the designers of the program, Roger Keating and Ian Trout from Strategic Studies Group Pty Ltd in Sydney, it isn't enough.



Subjective verdict: For war game freaks only. □

The good looking one on the left is Roger Keating. The other one is Ian Trout. "Carriers at War" is their

second joint effort and (coincidentally?) Strategic Studies Group's second game release. Both gents are avid game players, amateur historians, lovers of Greek food and red wine, fathers of very clever and beautiful children, ex school teachers and 35 years old. The only real difference is that the gent on the left has more brains.

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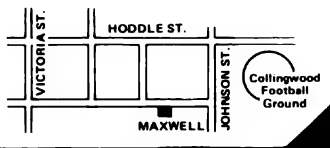

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An Introduction to Basic List Sorting

by David Brooks

You can write reasonable sorting in BASIC, but your choice of techniques makes a substantial difference in the results. The most common method of sorting lists, for instance, which owes its popularity to the fact that it is short and easy to understand, is by far the most inefficient. In BASIC, and Commodore BASIC is no exception, the slowness of this simple approach may lead the beginning programmer to believe that sorting in BASIC is hopeless. The truth is that better techniques can help significantly.

Of course, choosing the "best" technique depends on the problem being addressed. With this in mind let's take a look at some approaches to sorting lists. I'm going to discuss five different procedures, each accompanied by a corresponding BASIC program. For those of you with the inclination to look further into the details of sorting, I recommend: Donald E. Knuth, "The Art of Computer Programming", Volume 3/Sorting and Searching, Addison-Wesley, 1973. This classic work contains extensive discussions of much of what I am going to show you, but usually not at a level that is accessible to the casual BASIC programmer.

The Bubble Sort

The Bubble Sort is the notoriously inefficient procedure I mentioned above, so **please** don't use it just because it's the one I mentioned first in my discussion!

Let's review what a sorting program (or subroutine, more probably) should do. We start with a list of numbers (or characters) in some arbitrary order. We'd like to put this list into a specific order. We have the choice of ascending or descending order for numbers and the equivalent in alphabetical order for characters. A Bubble Sort program for numbers is given in Listing 1.

Line 5Ø generates a random list of integers from one to N. Lines 7Ø-9Ø sort the list in ascending order. Lines 6Ø and 1ØØ read Commodore "jiffies" from the variable TI in order to time the sorting procedure. (One jiffie is 1/6Ø second.) The sorted array is printed in line 11Ø. Note that the sorting procedure itself only takes three lines!

The arrangement of the Bubble Sort program will be shared by the other programs I'm going to discuss in this article. First a specified number of items is generated in random order and printed. Then just at the beginning and end of the sorting procedure itself, the computer time (in jiffies) is stored. Finally the sorted list and sorting time is printed.

The Bubble Sort works by comparing each item in the list with the preceding one. If the item is smaller than the preceding one, then the items are exchanged. The exchange is performed by storing the value of the item A(I) in the variable T, replacing A(I) with A(I-1) and finally giving A(I-1) the value stored in T.

Note that the original is sorted "in place" without taking additional memory space for the sorted array. This is called a "replacement" sort.

After the first trip through the loop on I, from two to J (the second part of line 7Ø), the largest element in the list will be at the top (because J=N). This is the source of the name Bubble Sort: the largest element appears to float to the top like a bubble.

On the second trip through the loop on I, the upper limit J is lowered to N-1 because the largest item has been moved to the Nth position and we don't have to worry about it anymore. You can obsevre this bubbling by replacing line 9Ø with:

9Ø NEXT: FOR K = 1 TO N :PRINT A(K);: NEXT :PRINT: NEXT

There are two more things to notice about this program. First, you can put the list in descending order simply by replacing the "<" in line 8Ø with a ">". Second, you can sort characters just as easily as numbers by making use of the fact that each character is represented by a numerical (ASCII) code. (See page 135 of the Commodore 64 user's guide, for example.) I'll have more to say about character sorting later.

At first glance, this simple program appears to be a solution to the sorting problem. But there's a catch. Let's look at the time required to sort lists of differant lengths, as shown in Table 1. The time for the Bubble Sort to put a list of length N in ascending or descending order varies from one second for N = 1Ø to 117 seconds for N = 1ØØ. This time can be represented by the function: sorting time = aN seconds where N is the number of items to be sorted and "a" is a constant determined simply by trying the Bubble Sort program. For my 64 I determined the value of a to be about Ø.Ø12. But no matter how small the value of a, the catch is that the time required to sort a list is proportional to the square of the number of items in the list. Thus, a list of 1ØØ numbers takes 1ØØ times as long to sort as a list of 1Ø numbers! And if the list has 1ØØØ items it would take about 12,ØØØ seconds, or 2ØØ minutes, to sort with Bubble Sort! If you want to sort and organize lists like these, you might well conclude that a BASIC program will be too slow to be useful.

The first step toward speeding up the sorting procedure is to understand the source of the problem. Note that in the Bubble Sort, a large item on its way to the top of the list advances only one item at a time, by comparisons and exchanges. Now let's look at an algorithm that attempts to shorten this path.

The Shell-Metzner Sort

The Shell-Metzner Sort, shown in Listing 2, uses a different approach to produce exactly the same results as the Bubble sort. There's no point pretending that this algorithm is as easy to understand as the Bubble Sort, but let's look at how it will start for a list of 2Ø items. Line 7Ø sets M to ten. Line 8Ø sets J to one and line 9Ø sets I to one. Line 1ØØ sets L to 1+1Ø=11. Now, in line 1ØØ, the first item is compared with the eleventh item in the list and exchanged with it, if required, in line 11Ø. This is the crucial step in the program. If the first item in the list is large, all the intermediate comparisons that would have been done by the Bubble Sort have been eliminated. It's not easy to follow what happens next, but the

idea is that, on the average, the Shell-Metzner Sort will eliminate a lot of the step-by-step exchanges that the Bubble Sort goes through. The theory for optimizing this sorting operation is, as mathematicians like to say, "nontrivial".

The performance of the Shell-Metzner Sort is also shown in Table 1. The relationship between time and the number of items in the list is mathematically more complicated now; its exact form isn't important for our purposes. Suffice it to say that the Shell-Metzner Sort takes only about 25 times as long to sort a list of 100 numbers as it does 10, whereas the Bubble Sort takes 100 times as long. This is a significant improvement over the Bubble Sort, and it gets even better as the list gets longer. Sorting a list of 1,000 items should take only about six minutes instead of the 200 required by the Bubble Sort.

Can further improvements be made? Yes, and the key to understanding how is to note that both the Bubble Sort and the Shell-Metzner Sort operate on the entire list at once. The Bubble Sort is a "brute force" technique, whereas the Shell-Metzner Sort gains efficiency by trying to minimize the number of exchange operations performed.

Heapsort and Quicksort

These two sorting procedures are much more difficult to understand than the first two. Both of them attempt to speed up the sorting of long lists by breaking the list into shorter pieces in particular ways.

To see how this works to our advantage, consider a simple sorting procedure like the Bubble Sort which takes N time units to sort a list of N items. A list of 100 items required 10,000 time units, but two lists of 50 items each will require only 2x2,500 time units. If the list could be further broken down into ten lists of ten items each, it would then require only 10x100=1,000 time units to sort.

Heapsort and Quicksort spend some of their time subdividing the list to be sorted in order to reduce the overall time required to sort the list. Programs for Heapsort and Quicksort are given in Listing 3 and 4. Although they look harmless enough, a full analysis of both programs is really beyond the scope of this article. The proof that they work, and work well, is found in their performance, as shown in Table 1.

You can see that Quicksort is substantially faster than the Shell-Metzner Sort, taking only about 17 seconds to sort 100 numbers, whereas Heapsort is about the same as the Shell-Metzner Sort. I should point out, however, that the absolute and relative performance of each of the programs I've shown you depends somewhat on the length and initial order of the list to be stored. A random list is a good starting point for testing, but it's not necessarily a full or totally fair comparison of the procedures. For example, Quicksort's performance can be shown to deteriorate badly under certain conditions (it doesn't do very well with lists that are initially almost in order). On the other hand, it can be shown that Heapsort's worst performance is not much different from its average performance.

The Distribution Counting Sort

I'd like to look at just one more sorting technique. The programs I've shown you so far have at least one important thing in common: They are designed to work with any list of items. This ignores the fact that some lists have properties that lend themselves to a particular approach.

Let's take sorting alphabetical characters as an example. This task has one notable feature: no matter how many items there are in the list, there will never be more than 26 **different** items (the letters A-Z). The Distribution Counting Sort goes through a list of letters and counts the appearances of each letter. This list of categories is used to construct a sorted version of the original list of items. Because the original list of N items has to be processed only twice, once for counting and once for producing the new sorted list, sorting time for this procedure is proportional to N (instead of N^2, for example). A Distribution Counting Sort program is shown in Listing 5a.

As always, the ultimate test is performance, as indicated in Table 1. Sorting 100 alphabetical characters takes only about four seconds. You can sort 1000 characters in only 40 seconds! The advantage of the Distribution Counting Sort over Quicksort increases as the list gets longer. It's interesting to note that every list of length N takes exactly the same amount of time to sort. There are no worst cases for the Distribution Counting Sort!

The observant reader may notice a possible hidden cost of the Distribution Counting Sort; it's not a replacement sort. The sorted list (S$ in the program) and the original list (A$) must coexist in memory. So, sorting a list of N letters requires array storage space of 2xN, plus space for the distribution counting array (C$). Is this a problem? It depends on your application and equipment. The 64's memory, for example, may hold a much longer list than can be sorted in a "reasonable" length of time, whereas the VIC 20 might not have any memory to spare.

In any case, this method can be transformed into a replacement sort at the expense of (what else?) time. I've given such a version in Listing 5b. Except for the distribution counting array and a few variables for temporary storage (which are required for all replacement sorts) a list of N letters requires an array storage space of only N.

Applying sorting techniques to real problems

The different properties of these sorting techniques will become more significant as you apply them to real problems. Technique does make a difference. We've seen that, for a list of 1000 items, the sorting times have varied from four to 120 seconds, and for 1000 items the projected range (I

haven't tried the worst case) is from 40 to 12000 seconds!

However, I haven't told you the bad news: nobody much cares about sorting lists of numbers or letters. The interesting problems are all a little more complicated than that.

Suppose, for example, you want to write a program for recording and analyzing household expenses. You'd like to be able to enter and store the expenses according to either type or date for the purpose of calculating subtotals.

Flexible list sorting is a requirement for such a program. Note that it won't be sufficient to sort expenses **only** by type **or** date. You need to be able to sort both ways to get an effective analysis.

At this point you may disagree with my formulation of this particular problem. However, I maintain that it is generally representative of problems you will face.

Many lists you will want to sort will contain several variables (in the form of character fields) within each record (for example, the date, type of expense and amount), and any one of these several fields should be usable as the primary "key" for sorting. To decide how to write a suitable sorting program, let's make up a short list of household transactions.

Household transactions in random order

12/12/83	telephone	55.50
10/20/83	telephone	40.00
12/17/83	electricity	67.00
05/04/83	telephone	39.50
05/06/83	electricity	89.50

Using a household expense program, we'd like to be able to sort this list in two different ways: by expense category and by date.

The key to sorting these multiple field records is to realize that BASIC includes the ability to compare character strings. The computer operating system performs the comparisons by looking at the ASCII codes of the characters. Hence "A" is "less than" "B" because, at least on Commodore machines, ASC("A")=65 and ASC("B")=66. Similarly, "&" is "less than" "9" because of the ASCII codes assigned to these characters. When the computer evaluates multicharacter strings, the decisions it makes are the same ones you would make if you were alphabetizing words by hand, but extended to include the additional characters that the computer recognizes.

These character comparisons and logical decisions are performed in machine language as the result of simple BASIC commands, and they're certainly tremendously faster than programming character-by-character comparisons yourself using the BASIC string manipulation functions. You might think that long strings would take a lot longer to compare than short ones. However, because the time required to execute machine language instructions is small relative to the time needed to interpret BASIC instructions, this difference is almost negligible.

Armed with this knowledge, we're in a better position to attack the sorting problem for multi-field records. We may first have to rearrange the fields in each record so that a left-to-right evaluation will result in the list being "alphabetized" in the desired way.

Suppose we decide to sort the list by expense category. This could be accomplished by rearranging the records in the following way:

Household transactions rearranged for sorting by type

telephone	12/12/83	55.50
telephone	10/20/83	40.00
electricity	12/17/83	67.00
telephone	05/04/83	39.50
electricity	05/06/83	89.50

Note that blanks are important: "telephone " is greater than "telephone". Note also that "5/" would be greater than "12", so proper ordering by date requires that months and days with a value less than ten must include leading zeros or spaces: "05" is less than "12".

Now, we're in a position to apply any of the sorting techniques I've discussed earlier. The Distribution Counting Sort is immediately attractive because of its speed, but in the present case the number of sorting categories is not small compared to the potential number of items in the list. If we require that "telephone 12/12/83" be greater than "telephone 10/20/83" (rather than being content to collect all "telephone" expenses, or even all expenses beginning with "t", in whatever order they happen to occur) then every day in the year for each expense type constitutes a separate sorting category. This will mean, in general, that the number of possible categories will **exceed** the length of the original list of expenses. As a result, storing the counting array can be a real problem.

There are two directions we can take now. We can forget about the Distribution Counting Sort and use an alternate sorting technique, or we can combine the Distribution Counting Sort with another method. For the latter case, we could use the Distribution Counting Sort to sort the records by the primary key, either month or first letter of the type of expense, and then use another technique to sort the records within each primary category. This takes advantage of the fact that there are only 12 possible months, and we would assume that there are fewer expense categories than there are records.

Combining two different sorting techniques will require some extensive programming, so let's look at the simpler case first. Program Record Sort 1 in Listing 6 illustrates how to sort expense records by type or month using Quicksort. Here's an explanation of how it works.

Lines 130-320: Store a list of 20 expense records in data statements. In a real application, this information would be stored on an external file and there would be many more than 20 records!

Lines 330-350: Read the records and rearrange them in random order each time you run the program.

Lines 360-390: Select the primary sorting key, either expense type or date. Read the current computer time (in variable TI). Select field boundaries for rearranging the records prior to sorting. (For the data as given, the rearranging could be eliminated for sorting by date because the records are already arranged properly.)

Lines 400-420: Rearrange the records.

Line 430: Calculate the computer time (in jiffies) required to rearrange the data. Read the current computer time.

Lines 430-570: Quicksort, as previously described in Listing 4.
Lines 580-620: Calculate computer time required to sort the list and print all the results. Note that what I've called rearranging time has to be counted in evaluating the total performance of this program. Record Sort 1 takes about four seconds to sort the list of 20 records.

At this point I'd like to introduce one more idea about sorting, which applies only when the list being sorted consists of multi-character records rather than single characters or numbers.

Commodore computers use what's known as dynamic memory allocation for string variables. This means, essentially, that you're never quite sure where the elements of A$ (in Record Sort 1) are going to be stored. For long lists of records, the operating system will sometimes have to tidy up its memory allocation, and this operation can be very time-consuming.

A way to avoid this problem is to sort, not the records themselves, but only pointers to the records. This is called Tag Sorting. Record Sort 1 can easily be converted to a Tag Sort, retaining the Quicksort procedure, by making these changes to Listing 6:

These changes don't noticeably change the program performance; it still takes about four seconds to rearrange and sort 20 records. However, substantial time saving should result whenever the number of records is large enough to activate the operating system's memory allocation cleanup routine. Note that Tag Sorting requires an array of length N (20 in this case) to hold the tags. This might seem to double the storage requirements, but it doesn't because each element of the tag array takes much less space than each record of the data array.

Putting it all together

Now we're ready for a program that ties together all the ideas I've discussed. It uses a combination of the Distribution Counting Sort and Quicksort, as well as the Tag Sorting concept. Don't fall into the trap of thinking that long, complicated code can't possibly be more efficient than a short, simple code. Especially for sorting, the structure of the procedures, not their length, determines program efficiency. The potential differences in performance are sufficiently large that we can tolerate quite a bit of programming overhead to arrive at an efficient sorting scheme.

Program Record Sort 2 is given in Listing 7. This program is an expansion of Record Sort 1 that uses a two-level sorting process. The first level is a Distribution Counting Sort applied to part of the primary field, either expense category or date. For sorting by category, the list is arranged according to the first letter of category description. For sorting by date, the list is arranged according to the numerical value of the two characters representing the month.

The Distribution Counting Sort uses a non replacement approach, but the new array that's generated is a list of pointers (tags) rather than a sorted copy of the original list of records. The second sorting level is a Quicksort applied to the items in each category. The result is that expenses within any category are always in chronological order.

The program is written without REMs to keep its operation as efficient as possible. Here's a discussion of how it works.

Lines 140-340: Dimension arrays and specify a set of 20 test records.

Lines 350-360: Shuffle the A$ array into random order at the start of each program run. This is done for program evaluation because the program performance depends somewhat on the original order of the records.

Lines 370-400: Decide to sort according to type or date. Start timing the sorting process by reading the jiffy clock value in TI. For sorting by type, specify the location of the first character in the type description. The value SH allows the ASCII values of letters A-Z (65-90) to be shifted to numbers 1-26. Specify the number of categories (12 or 26) for each choice.

Lines 410-420: Generate the distribution counting arrays for sorting by expense category or date. If a list contains, for example, five words starting with A, three with B and six with C, then C(1)+5, C(2)+3 and C(3)=6. I've used a completely separate FOR . . . NEXT loop for each sort because this is more efficient than an IF . . . THEN test within a single loop.

Line 430: Convert the distribution counting array into a cumulative array. This means that each element in the array contains a number equal to the total number of entries corresponding to that element and all earlier ones. For the example above, the first three elements of C will become C(1)=5, C(2)=8 and C(3)=14. In a subsequent operation the C array will be destroyed, but its values will still be needed for the second level of sorting, so another array, C1, is defined which will preserve the values stored in C.

Lines 440-470: Do the Distribution Counting Sort for expense category date. Note that the new array produced during the sorting is a pointer array TG and not the sorted version of the original array. (See the discussion of Listing 5a). Since the tag array will generally take much less space than the character fields, this is a more efficient approach. It's also easier to program, and executes faster than the replacement version of a Distribution Counting Sort. (See Listing 5b).

Lines 480-640: Do a Quicksort on each category (from one to CT). Note that Quicksort is very easy to apply to any portion of a list. The first and last elements to be sorted appear directly only once, where they're assigned to variables F and L in line 500.

Lines 650-680: End the sort timing by reading the jiffy clock. Print the sorted array by using the TG array as an index. This should be suitable for most purposes, although you may be able to envisage circumstances in which a tag sort such as this wouldn't be as convenient as literally re-ordering the original records. □

Listing 1. Bubble Sort

```
10 REM PROGRAM BUBBLESORT
20 REM DAVID R. BROOKS, MAR. 84
30 DIM A(100)
40 INPUT"HOW MANY ITEMS";N
50 FOR I=1 TO N:A(I)=1+INT(RND(0)*N)
   :PRINT A(I);:NEXT:PRINT
60 T1=TI
70 FOR J=N TO 2 STEP-1:FOR I=2 TO J
80 IF A(I)<A(I-1)THEN T=A(I)
   :A(I)=A(I-1):A(I-1)=T
90 NEXT:NEXT
100 PRINT"TIME UNITS ="TI-T1
110 FOR I=1 TO N:PRINT A(I);:NEXT
   :PRINT
120 STOP
```

Listing 2. Shell-Metzner

```
10 REM PROGRAM SHELL-METZNER
20 REM DAVID R. BROOKS, MAR. 84
30 DIM A(100)
40 INPUT"HOW MANY ITEMS";N
50 FOR I=1 TO N:A(I)=1+INT(RND(0)*N)
   :PRINT A(I);:NEXT:PRINT
60 T1=TI:M=N
70 M=INT(M/2):IF M=0 THEN 150
80 K=N-M:J=1
90 I=J
100 L=I+M:IF A(I)<=A(L)THEN 130
110 T=A(I):A(I)=A(L):A(L)=T:I=I-M
   :IF I>=1 GOTO 100
120 I=I-M:IF I>=1 GOTO 100
130 J=J+1:IF J>K THEN 70
140 GOTO 90
150 PRINT"TIME UNITS ="TI-T1
160 FOR I=1 TO N:PRINT A(I);:NEXT
   :PRINT
170 STOP
```

Listing 3. Heapsort

```
10 REM PROGRAM HEAPSORT
20 REM DAVID R. BROOKS, MAR. 84
30 DIM A(100)
40 INPUT"HOW MANY ITEMS";N
50 FOR I=1 TO N:A(I)=1+INT(RND(0)*N)
   :PRINT A(I);:NEXT:PRINT
60 T1=TI
70 M=N:FOR L=INT(N/2)TO 1 STEP-1
   :B=A(L):GOSUB 120:NEXT
80 L=1:FOR M=N-1 TO 1 STEP-1:B=A(M+1)
   :A(M+1)=A(1):GOSUB 120:NEXT
90 PRINT"TIME UNITS =";TI-T1
100 FOR I=1 TO N:PRINT A(I);:NEXT
   :PRINT
110 STOP
120 I=L
130 J=I+I
140 IF J>M THEN 190
150 IF J=M THEN 170
160 IF A(J+1)>A(J)THEN J=J+1
170 IF B>=A(J)THEN 190
180 A(I)=A(J):I=J:GOTO 130
190 A(I)=B
200 RETURN
```

Listing 4. Quicksort

```
10 REM PROGRAM QUICKSORT
20 REM DAVID R. BROOKS, MAR. 84
30 DIM A(100),F(15),L(15)
40 INPUT"HOW MANY ITEMS";N
50 FOR I=1 TO N:A(I)=1+INT(RND(0)*N)
   :PRINT A(I);:NEXT:PRINT
60 T1=TI
70 S=0:F=1:L=N
80 M=A(INT((L+F)/2)):I=F:J=L
90 IF A(I)<M THEN I=I+1:GOTO 90
100 IF A(J)>M THEN J=J-1:GOTO 100
110 IF I>J THEN 160
120 IF I=J THEN 140
130 T=A(I):A(I)=A(J):A(J)=T
140 I=I+1:J=J-1
150 IF I<=J THEN 90
160 IF I>=L THEN 180
170 F(S)=I:L(S)=L:S=S+1
180 L=J:IF F<L THEN 80
190 IF S=0 THEN 210
200 S=S-1:F=F(S):L=L(S):GOTO 80
210 PRINT"TIME UNITS ="TI-T1
220 FOR I=1 TO N:PRINT A(I);:NEXT
```

Listing 5a. Distribution Counting Sort

```
10 REM DISTRIBUTION COUNTING SORT
20 REM DAVID R. BROOKS, MAR. 84
30 DIM C(26),A$(100),S$(100)
40 INPUT"HOW MANY ITEMS";N
50 FOR I=1 TO N:A$(I)=CHR$(65+INT(RND
   (0)*26)):PRINT A$(I);:NEXT:PRINT
60 T1=TI
70 FOR I=1 TO N:T=ASC(A$(I))-64
   :C(T)=C(T)+1:NEXT:REM C(T)
   CONTAINS # ENTRIES FOR T
80 FOR K=1 TO 26:C(K)=C(K)+C(K-1):NEXT
90 FOR J=N TO 1 STEP-1:T=ASC(A$(J))-64
   :I=C(T):S$(I)=A$(J):C(T)=I-1:NEXT
100 PRINT"TIME"TI-T1
110 FOR I=1 TO N:PRINT S$(I);:NEXT
   :PRINT
120 STOP
```

Listing 5b. Distribution Replacement

```
10 REM DISTRIBUTION COUNTING SORT
20 REM REPLACEMENT VERSION
30 REM DAVID R. BROOKS, MAR. 84
40 DIM C(26),A$(100)
50 INPUT"HOW MANY ITEMS";N
60 FOR I=1 TO N:A$(I)=CHR$(65+INT(RND
   (0)*26)):PRINT A$(I);:NEXT:PRINT
70 T1=TI
80 FOR I=1 TO N:T=ASC(A$(I))-64
   :C(T)=C(T)+1:NEXT
90 FOR K=1 TO 26:C(K)=C(K)+C(K-1):NEXT
100 R=N
110 IF R=0 THEN 130
120 KR=ASC(A$(R))-64:IF C(KR)<R THEN
   R=R-1:GOTO 110
130 IF C(KR)=R THEN C(KR)=C(KR)-1
   :R=R-1:GOTO 110
140 R$=A$(R):KR=ASC(A$(R))-64:J=C(KR)
   :C(KR)=J-1
```

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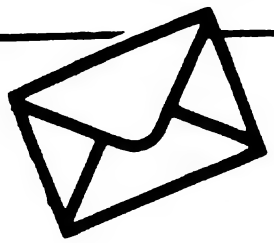

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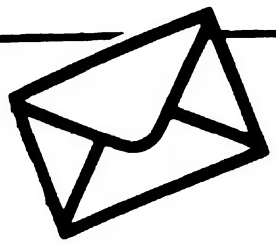

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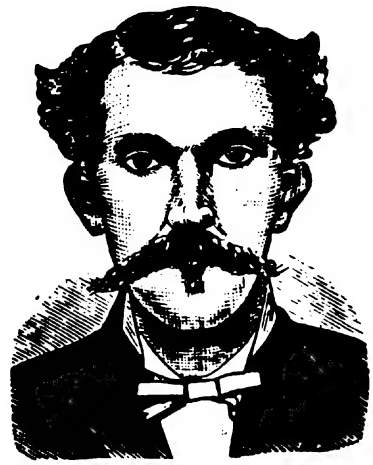

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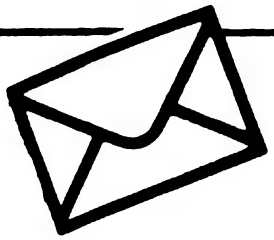

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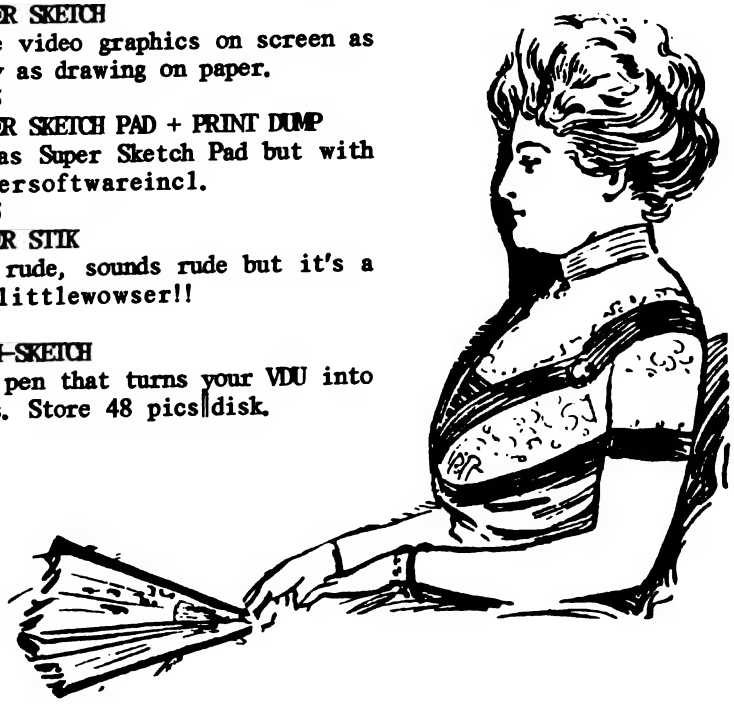

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I have carefully looked over the entire range of software and hardware being offered in this mail order list, and believe that it is of good quality and excellent value for money.

Andrew Farrell, Editor

```
150 S$=A$(J):KJ=ASC(A$(J))-64:K=C(KJ)
    :C(KJ)=K-1:A$(J)=R$:R$=S$:J=K
160 IF J<>R THEN 150
170 A$(J)=R$:R=R-1:GOTO 110
180 PRINT"TIME"TI-T1:FOR I=1 TO N
    :PRINT A$(I);:NEXT:PRINT

400 FOR I=1 TO N
410 A$(I)=MID$(A$(I),S1,
    L1)+MID$(A$(I),S2,L2)+MID$(A$(I),
    S3,L3)
420 NEXT
430 T0=TI-T1:T1=TI
440 S=0:F=1:L=N
450 M$=A$(INT((L+F)/2)):I=F:J=L
460 IF A$(I)<M$THEN I=I+1:GOTO 460
470 IF A$(J)>M$THEN J=J-1:GOTO 470
480 IF I>J THEN 530
490 IF I=J THEN 510
500 T$=A$(I):A$(I)=A$(J):A$(J)=T$
510 I=I+1:J=J-1
520 IF I<=J THEN 460
530 IF I>=L THEN 550
540 F(S)=I:L(S)=L:S=S+1
550 L=J:IF F<L THEN 450
560 IF S=0 THEN 580
570 S=S-1:F=F(S):L=L(S):GOTO 450
580 TT=TI-T1
590 FOR I=1 TO N:PRINT A$(I):NEXT
    :PRINT
600 PRINT"REARRANGING TIME"T0
610 PRINT"SORTING TIME"TT
620 STOP
```

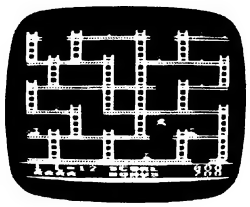
Listing 6. Record Sort 1

```
100 REM RECORD SORT 1
110 REM DAVID R. BROOKS, MAR. 84
120 N=20:DIM A$(20)
130 DATA 10/15/83TELEPHONE          44.56
140 DATA 09/30/83HEATING OIL        99.99
150 DATA 01/11/83ELECTRICITY        16.50
160 DATA 01/01/83WATER              25.00
170 DATA 10/20/83WATER              33.33
180 DATA 02/22/83ELECTRICITY        67.89
190 DATA 03/23/83ELECTRICITY        78.52
200 DATA 08/15/83ELECTRICITY        44.44
210 DATA 04/21/83ELECTRICITY        45.00
220 DATA 09/15/83TELEPHONE          46.99
230 DATA 07/17/83TELEPHONE          77.77
240 DATA 12/06/83INSURANCE         160.77
250 DATA 06/12/83INSURANCE         250.88
260 DATA 05/19/83ELECTRICITY        60.00
270 DATA 12/12/83ELECTRICITY       100.01
280 DATA 11/21/83ELECTRICITY        90.00
290 DATA 10/22/83ELECTRICITY        88.88
300 DATA 06/24/83ELECTRICITY        77.77
310 DATA 07/29/83ELECTRICITY        66.66
320 DATA 09/25/83ELECTRICITY        55.55
330 FOR I=1 TO N:READ A$(I):NEXT
340 FOR I=N TO 2 STEP-1:J=RND(0)*I+1
    :T$=A$(J):A$(J)=A$(I):A$(I)=T$
    :PRINT A$(I):NEXT
350 PRINT
360 INPUT"SORT BY DATE(D) OR TYPE(T)";
    Z$
370 T1=TI
380 IF Z$="T"THEN S1=9:L1=14:S2=1:L2=8
    :S3=23:L3=6
390 IF Z$="D"THEN S1=1:L1=8:S2=9:L2=14
    :S3=23:L3=6
```

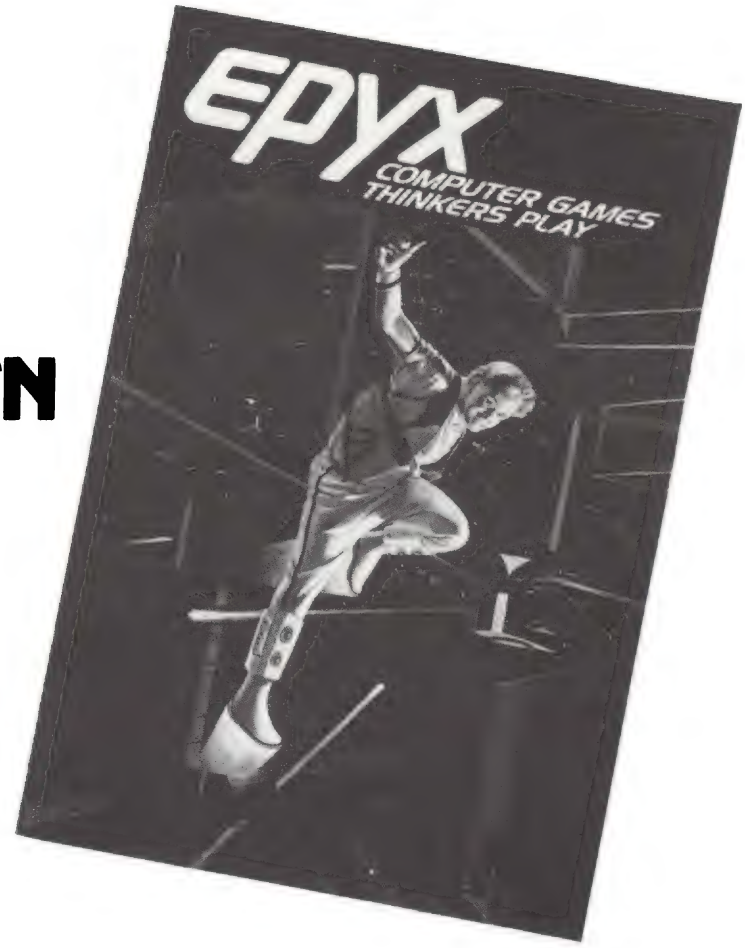
Listing 7. Record Sort 2

```
100 REM RECORD SORT 3
110 REM DAVID R. BROOKS, MAR. 84
120 REM DIST COUNT SORT PLUS QUICKSORT
130 REM TAGSORT VERSION
140 N=20:DIM A$(20),C(26),C1(26),
    TG(20)
150 DATA 10/15/83TELEPHONE          44.56
160 DATA 09/30/83HEATING OIL        99.99
170 DATA 01/11/83ELECTRICITY        16.50
180 DATA 01/01/83WATER              25.00
190 DATA 10/20/83WATER              33.33
200 DATA 02/22/83ELECTRICITY        67.89
210 DATA 03/23/83ELECTRICITY        78.52
220 DATA 08/15/83ELECTRICITY        44.44
230 DATA 04/21/83ELECTRICITY        45.00
240 DATA 09/15/83TELEPHONE          46.99
250 DATA 07/17/83TELEPHONE          77.77
260 DATA 12/06/83INSURANCE         160.77
270 DATA 06/12/83INSURANCE         250.88
280 DATA 05/19/83ELECTRICITY        60.00
290 DATA 12/12/83ELECTRICITY       100.01
300 DATA 11/21/83ELECTRICITY        90.00
310 DATA 10/22/83ELECTRICITY        88.88
320 DATA 06/24/83ELECTRICITY        77.77
330 DATA 07/29/83ELECTRICITY        66.66
340 DATA 09/25/83ELECTRICITY        55.55
350 FOR I=1 TO N:READ A$(I):NEXT
360 FOR I=N TO 2 STEP-1:J=RND(0)*I+1
    :T$=A$(J):A$(J)=A$(I):A$(I)=T$
    :PRINT A$(I):NEXT
370 PRINT:INPUT"SORT BY DATE(D) OR
    TYPE(T)";Z$
380 T1=TI
390 IF Z$="T"THEN S1=9:SH=64:CT=26
    :GOTO 410
400 IF Z$="D"THEN:CT=12:GOTO 420
410 FOR I=1 TO N:T=ASC(MID$(A$(I),S1,
    1))-SH:C(T)=C(T)+1:NEXT:GOTO 430
420 FOR I=1 TO N:T=VAL(LEFT$(A$(I),2))
    :C(T)=C(T)+1:NEXT
430 FOR K=1 TO 26:C(K)=C(K)+C(K-1)
    :C1(K)=C(K):NEXT
440 IF Z$="D"THEN 470
450 FOR J=N TO 1 STEP-1
    :T=ASC(MID$(A$(J),S1,1))-SH
    :TG(C(T))=J:C(T)=C(T)-1
460 NEXT:GOTO 480
470 FOR J=N TO 1 STEP-1
    :T=VAL(LEFT$(A$(J),2)):TG(C(T))=J
    :C(T)=C(T)-1:NEXT
480 C1(0)=0
490 FOR K=1 TO CT:IF C1(K)-C1(K-1)<2
    THEN 640
500 S=0:F=C1(K-1)+1:L=C1(K)
510 M$=A$(TG(INT((L+F)/2))):I=F:J=L
520 IF A$(TG(I))<M$THEN I=I+1:GOTO 520
530 IF A$(TG(J))>M$THEN J=J-1:GOTO 530
540 IF I>J THEN 590
550 IF I=J THEN 570
560 T=TG(I):TG(I)=TG(J):TG(J)=T
570 I=I+1:J=J-1
580 IF I<=J THEN 520
590 IF I>=L THEN 610
600 F(S)=I:L(S)=L:S=S+1
610 L=J:IF F<L THEN 510
620 IF S=0 THEN 640
630 S=S-1:F=F(S):L=L(S):GOTO 510
640 NEXT
650 TT=TI-T1
660 FOR I=1 TO N:PRINT A$(TG(I)):NEXT
670 PRINT"TOTAL SORT TIME"TT
680 STOP
```

Jumpman versus Loderunner



JUMPMAN



JUMPMAN: **Arcade**
1 disk (uses back), instructions
Requirements: **DOS 3.3**
Cost: **$39.95**
Available: **Beagle CS**

Jumpman is not a brand new game. It's been around a while in the States and has developed a type of cult following reminiscent of Loderunner. There are however many differences between the two games and that is why I think both can co-exist in your software library – unless of course you're an indecisive sort of person who would have immense difficulty in deciding which to play when!

The aim in both games is to collect all the gold or explosives on the particular level or board and by so doing proceed to the next. For those who are unaware of these games, a degree of strategy must be employed against the opponents; you can not adopt Space Invader/ Galaxian mentality in order to succeed.

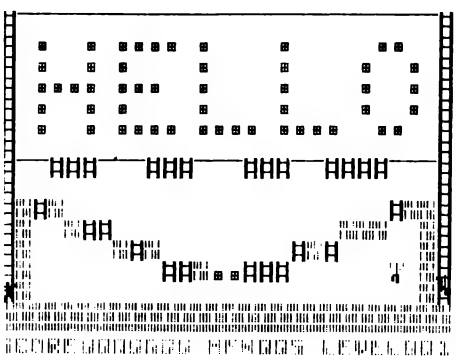
ACTION	LODERUNNER	JUMPMAN
Aim to collect	gold	explosives
Is able to jump	NO	YES
Is able to fall	YES	NO
Is shot at	NO	YES
Can kill adversaries	YES	YES
Number of screens	can create	30
Regularity of particular screen	YES	YES
Regularity of adversaries	YES	some random
Speed (difficulty) levels	NO	YES

By looking at the table, it is clear that Jumpman is more arcade in that decisions have to be made far quicker. In Loderunner you can stand at a particular point on the board and experience complete safety while you think out your next move – there are havens everywhere. In Jumpman you can't even go up and down the same rope!

So which is better? Graphics-wise, I'd say Loderunner, but . . . certainly for action, Jumpman is faster. The other consideration is replayability. Once I've been there and done that, the games usually hold about as much interest as dead fish. For me, it's SOLVING rather than POINTS – if it's the same for you and you've done Loderunner, then I doubt you'll be disappointed.

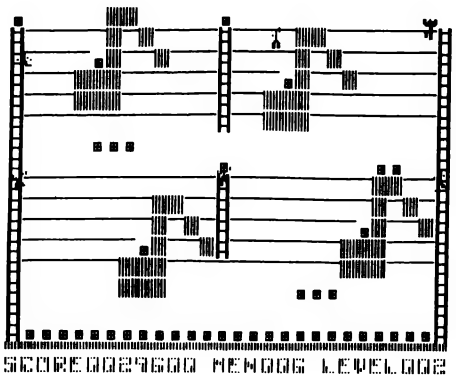
Loderunner and Jumpman clinic

One may be excused for thinking that the AAR is becoming a medical journal. In some ways perhaps this section may aid in the mental well-being of many who own Championship Loderunner and/or Jumpman and who have not yet seen all the levels. But how do you give clues without giving the game away? I don't think you can, so please only use this as a last resort. After all there is nothing more annoying than to be stuck on a level and never being able to see the next . . .



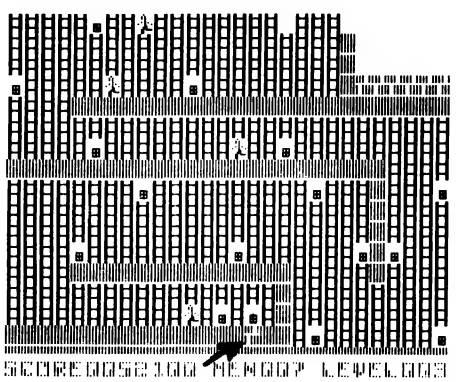
Loderunner Screen #1

The problem here is in the two low barrels. You can't go down to them because you'll be trapped. The solution is to get the men to bring them out. But, if you go low, the men get trapped themselves and not always (snigger snigger) with a barrel. Your objective is therefore to release them and then make them drop at the most opportune time. Incidentally, the men can be killed down there, and certain individuals around the office delight in inflating their otherwise unimpressive scores in this most ungamely way.



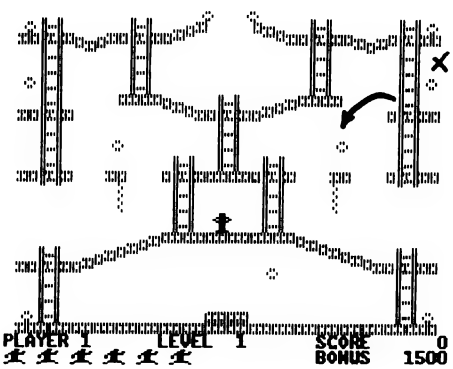
Loderunner Screen #2 (Music Maestro)

The clue to this level is to get the men onto one side, and preferably not the side you are on. This is easily achieved by standing on particular rungs of the side ladders. From then on it's all in the leg work.



Loderunner Screen #3 (Ladders Galore)

Speed and nerves of steel are the keys to success. The trickiest bend is the first – but don't be afraid to go in the opposite direction to that in which you are drawn. After that you can get rid of ALL the men, one by one. The solution is in the screen. I have marked where you should dig – but don't do this too early or too late as that will encourage disaster.



Jumpman Screen #1 (Easy Does It)

The key to this screen is in the second last bomb you collect (marked with a X). When you have it, a portion of the ladder below you breaks away. Go down and JUMP! So what if it looks like certain death. Your leap should get that last explosive, and getting that will move you – believe it or not – to level two. □

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BMS 269

A beginner's guide

The care and feeding of your digital pal

by Colin Beecroft

A few words on the random nature of electronic failures. Apart from some sure fire causes which I will show you how to avoid, the main source of computer breakdown occurs at microscopic level inside an integrated circuit. The why and how of IC failures are best obtained from a solid state physicist.

I can only give you the benefit of my experience gained during ten years of repairing faulty machines. Most faults are entirely random and quite unpredictable. One machine will run perfectly and another will be plagued with faults. Statistics don't lie, although the beleagured owner of a faulty computer may well feel like arguing the case.

If statistical analysis shows that we can expect one fault per two years per machine you can be sure that somebody, somewhere, will collect 10 years worth of failures in two months. It is unfortunate for the owner but at least some small comfort can be derived from the figures, it is only a matter of cold statistics, your computer doesn't really hate you.

What can I do ?

There are a few sources of computer failure that are under the direct control of the user. If you do something bad to your machine you can expect a higher than average failure rate. If you do something really nasty, it'll blow for sure. To give you an idea of what to watch for I will look at each part of a typical computer system separately. You'll notice however that there are three important common factors that raise their ugly heads: static electricity, heat and humidity.

Static

Static electricity is caused by a surplus or deficit of electrons on a charged body. (You always knew you had a magnetic personality.) Usually the body in question is yours. Normally any static charge you build up is slowly dissipated into the atmosphere or lost to an earthed object upon contact. The dryer the air, the longer a static charge will remain upon your person.

Have you ever walked through a building with a dry air conditioned atmosphere across synthetic carpet and received a nasty 'bite' as you reached for the door handle? Try the same thing in low lighting and you'll be amazed at how big a spark can be generated. That same electrical discharge, which you find annoying, generally will prove fatal to your microcomputer.

There are two approaches to the problem. First, ensure that you are at the same potential as your computer before you touch any part of it eg. touch the metal cabinet of your video monitor or some other earthed object (the kitchen sink?). Second and preferably, avoid picking up the static charge in the first place.

Static electricity is generated when two different materials are rubbed to - gether eg. shoe soles on carpet, trousers across upholstery, plastic rubbed with silk. Install your computer in an area with vinyl or wood flooring, avoid carpet (particularly synthetic) like the plague. If your better half won't allow you to tear up the lounge carpet then look into some of the carpet treatment chemicals available for static reduction.

At least one commercial installation I know of, in a state of desperation, finally eliminated a very troublesome intermittent data corruption problem by tearing up the computer room carpets and replacing them with vinyl tiles. One other suggestion, watch the materials in your computer chair. Many comfy chairs use fabrics that can generate a good charge as you slip in and out of them.

Heat

Your computer consumes electricity. The laws of thermodynamics (I've always wanted to say that) forbid the destruction or creation of energy, it may only be transformed from one form to another. The electrical energy your computer consumes is turned into heat. Some chips produce more heat than others eg. the Video Interface Controller in the C64 has a metal leaf spring pressing down on it to conduct away heat to the sur - rounding metalwork.

Without this 'heatsink' the chip's temperature would climb to destructive levels. Neither the VIC-20 nor the C64 have much case ventilation and it is not unusual for the C64's internal temperature to be 30 degrees C above the outside air

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temperature. This simply means that to avoid heat related failure you must help your computer keep its cool.

Don't impede the air flow to the computer's already small ventilation holes. Always put the machine on a hard flat surface, never on a blanket or thick table cloth that could reduce the air flow. Keep the computer away from sources of external heat reading lamps, sunlight, radiators.

Avoid operation when the ambient temperature is extreme (that means summer), or if you must, use a fan to ensure a steady air flow over the machine and keep operation to as short a time as possible. Now, if you think this sounds a little extreme, remember, it's not my computer that's going to suffer heat stroke and most commercial installations are air conditioned.

Humidity

Normally this doesn't make no never mind. However, should the humidity reach 100 per cent, moisture will condense on any available surface at or below dew point temperature. If this should happen corrosion can cause problems which often will not show up until later. The sorts of problems caused by condensation are unpredictable keyboards and intermittent failures caused by poor contacts in the multitude of metal to metal connections in the computer.

This problem is more significant in seaside areas due to airborne salt. The solution to this one is to avoid leaving your computer in a cold damp area. Make your computer room inside a warm dry house, avoid garages and other outbuildings. I don't have to elaborate, but this is a terrific one for the computerist who is not well received by his better half in the lounge and looks destined for the chook shed.

Dust

The cleaner's bane. It gets on and into everything, keyboards included. Switch contacts don't like it. There isn't a lot you can do about this one other than cover your computer when it's not in use and keep it in a relatively dust free environment (if such a thing exists judging by my lounge room).

Smoke - same as for dust, it isn't good for switch contacts (or people, at the risk of making myself unpopular with smokers).

Cassette drive

Many of the above comments apply to the cassette drive plus these few points. The major reliability factor with cassettes is head alignment. The magnetic record /play head has a vertical gap across which its magnetic field extends out into the tape.

A prerecorded tape carries the alignment of the head that recorded it. If it is replayed with a head that is other than vertical the output signal is lowered in level and distorted. A small amount of misalignment is tolerable, however if the misalignment is large then the tape becomes completely unreadable.

The sad thing is that a good jolt (read drop) or rough handling of the piano key controls can cause the head to realign itself to a position other than perpendicular to the tape. The only solution is to take the cassette to an experienced service workshop. In essence, treat your equipment gently. With usage tape heads tend to collect oxide particles from the tape. When this layer of oxide builds up it prevents close tape to head contact and data is lost. Open the cassette door, press play and look at the silver read /write head.

If it is bright and shiny all is well, but should it show any sign of a brown deposit, careful cleaning with a cotton bud saturated in alcohol or, at a pinch, clean methylated spirit will remove that deposit which so bedevils tape heads.

Disk drives

My comments regarding computers apply equally well with a

slightly different emphasis. Heat is a very significant problem with the 1541 drive. Quite simply the case has inadequate ventilation. The only solutions are to operate it with the top cover removed (cheap but fraught) or attach an external cooling fan. I haven't yet seen such an accessory available locally but next summer I'll need one. In case you are handy I would recommend an extraction fan mounted over the back on top of the ventilation slots.

Under warm ambient conditions the 1541 can show a tendency to realign itself due to the high internal temperatures it reaches. One other recommendation, use good quality disks as some shed their oxide surface, dirtying heads and causing read/write errors. Now to head cleaning. If you use good quality disks, keep your drive dry, dust free and happy you should clean its head every birthday (whether it needs it or not).

If you like to be very sure try twice a year. If it requires cleaning more often then you are either in business producing software or you need better disks. When you clean the heads use a reputable head cleaner available from most computer shops.

Disks

You must not expose floppy disks to the following: heat, magnetic fields, bending or other physical violence, dust, greasy fingers. Even the minute particles of smoke reduce the reliability of disks (you have been warned!). A couple of other considerations. With usage disks become less reliable, some sources suggest 25 to 30 hours of actual rotation, so keep backups and relegate heavily used disks to non-vital jobs after they have shown you long and faithful service.

The base material of disks has a small but distinct thermal expansion so a hot disk does not have the same dimensions as when it is cold. Use only disks which are at ambient temperature. If they are otherwise, allow them to stabilise at room temperature before use. I have one disk which will only read reliably after sitting in a hot disk drive for 15 minutes. This brings me to my final point, avoid leaving disks in the 1541 drive too long as they will become quite hot and anything saved may not load reliably when you first start up next day.

Printer

Essentially the same for computers with three additional things to watch for. Keep the printer clean of paper scrap and dust, they can clog the print head and jam the mechanism. Always use the recommended ribbon, a non standard ribbon can snag the print head wires in dot matrix types or clog thermal printers. Be careful not to drive matrix printers in reverse characters for long as the high duty cycle of the wire drive solenoids can cause them to overheat to their det - riment (that means they blow up).

If you can remember that lot you'll be able to look after your computer system well and I hope it will reward you with long and faithful service. As a friend of things electronic can I please ask one last favour? When it says in the handbooks and on instruction screens 'hit return', just press it.

Your computer will love you and I'll have fewer intermittent keyboards to test my patience.

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Making moving melodic objects

"Sprites and Sound on the Commodore 64"

by Peter Gerrard.

Reviewed by Ric Richardson

Try this quick quiz. Name two major advantages of the Commodore 64 that stand out when you play video games on it.

Could it be that its militaristic looking fawn colour matches well with your battle dress?

Could it be that its light weight and size are great for travelling the rounds on weekends from one challenger's house to the next?

If these obvious reasons did not answer the question then all I can do is point to the 64's excellent graphics and sound.

Sometimes it pays to go for the more subtle reasoning. It must pay, as computer store shelves testify, with the large number of books now available on the subject. A new arrival on these shelves is a book by Peter Gerrard.

Shall we delve?

Titled"Sprites and Sound on the Commodore 64", the contents are a balance of these two diversions, leaning more towards graphics. In fact most aspects of using graphics on the Commodore 64 are covered in some detail. Of note, are the areas of producing user defined characters and using high resolution graphics.

Three out of the ten chapters deal with sound, commencing with a rundown of the basics in music theory. I cannot help but feel that whenever this area is covered, the writer deals with the subject as if he was a fish out of water. This particular version is hard going.

A return to more familiar turf rounds the subject out with an explanation of the chip governing sound generation (6581 SID), and a simple setup that enables you to explore the 64's sound capabilities. Tha'ts about it for sound.

In the pluses category there is a wide selection of utility programs for later use on programming explorations and an interesting chapter devoted to adding ancillary commands to Basic, making life that little bit easier.

We are also left with another present of consequence . Its name, Extramon, a slice of home made software designed to help us work with machine code.

Formatting is a bit of a sore point.

Each topic seems to have been dealt with in isolation, and so we can sense a general lack of continuity. Presentation of each idea is very straightforward. Actually, thumbing through "Sprites & Sound" made me turn back the pages of time, only a paragraph mind you, to my schoolbook days. It is inclined to be a bit sparse in the frills department.

Meanwhile, back at the ranch, we find Mr Blackadar's contribution of value to readers who basically like a studious no frills approach, or who like the idea of getting some fairly good home made software for the price of an instruction manual. Fairly good

Hang on there, Mac

"Graphics Guide to the Commodore 64" by Charles Platt.

Reviewed by Ric Richardson

Ferrari, Hilton, Cardin, Australian Commodore Review, names that spell out excellence in their field, attention to detail along with articulate practicality. A new name now emerges to claim its place. Surprisingly, you will not find it on a racecourse, in a hotel, being worn by the beautiful people or on the coffee table at my place.

No, this name with a claim to fame can be found in the library of any up and coming game programmer. or lying open in front of anybody that aspires to be one. I should know, that's where my copy is.

You will find "Graphics Guide" to be a good read. The reason? Listen to these credentials.

Charles Platt is a professional writer who has authored several books on computers. He is a columnist for OMNI magazine who has 22 books to his credit, both fiction and non-fiction. He also teaches BASIC at The New School in New York and creates educational game programs for the Commodore 64.

Certainly, such experience would produce something special when the majority of writers, in such a relatively new area of literature,

have the technical qualifications but are only just starting to develop literary skills.

If you have worked through the 64 User Manual - not that you need to do so before reading the book - you will have most likely found the Programmers Reference Guide, our supposed next step, to be way beyond comprehension. This is where Mr Platt steps in to fill the gap. This ideal is presented in the introduction and is indeed fulfilled throughout the book.

The chapters take us step by step through the writing of a simple game program called Air Attack, starting off with the game in its most basic form then gradually helping us to make the program more and more sophisticated until, to our delight, we end up with a product that is not far behind the software keeping thousands of Arcade game centres in business. Noticeable is how the fundamental principles of memory management and advanced programming techniques are handled.

After completing a first reading of all eleven chapters you will find "Graphics Guide" to be useful as a reference book. Besides the basics in program design there are appendices that summarize all the facts, including memory maps that look to be easier to use than the ones supplied by Commodore; a sprite-building guide which involves much less arithmetic than the Commodore system; a complete scale drawing of the character sets not available even in Commodore's own Programmers Reference Guide; and some hints on how to handle the 1541 disk drive, which can be troublesome at times.

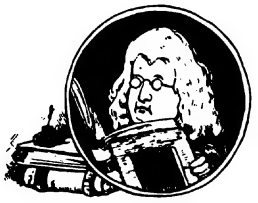
Some of the program listings are quite long. If you want to avoid the hassle it may be worth it to see if the distributors can get the disk or tape that accompanies the book at extra cost. It is said to contain: Air Attack - final version; a sprite demonstration program; a graphics generator; a character generator; a sprite generator; data files with the alternate character set; data files with three alphabets of headline letters; data files for the running sprite.

Presentation is plush with an abundance of illustrations including a few colour pages to give us an idea of how good the colours should look.

The general tone of the writing style gives you the impression that you have Mr Platt leaning over your shoulder in your own living room. He has gone to great lengths to make you feel at home with a technical and intellectually hard subject to work with. The pace is relaxed, ideas presented in a warm simple almost conversational way.

This is one of the better books on programming available. A forward moving philosophy underlies the concept of the book. We quote Mr Platt:

"The pleasure in programming doesn't come from learning techniques out of a book. The real pleasure, I think, is in going off on your own and figuring out new ways of doing things for yourself. I hope my book will take you to the point where you can start doing exactly that."



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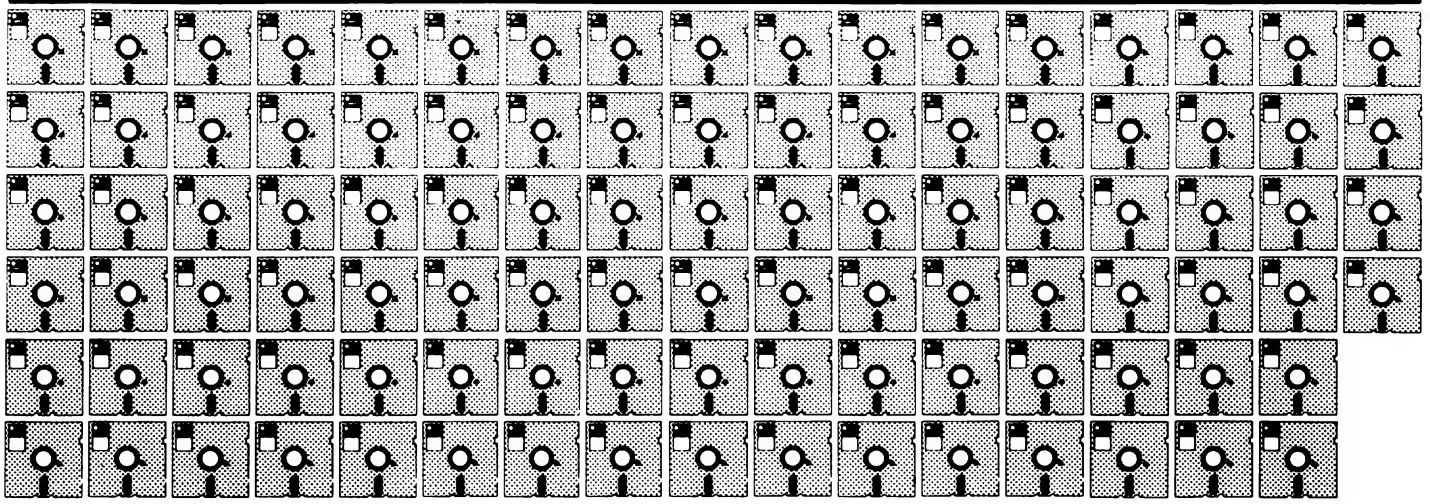

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Cures for the 1541 blues

"I got the 1541 blues mama, ma disk drive she's so slooow, Oh yeah".
"She's too ugly for a doorstop, So as a boat anchor she must go."

Sound familiar? The dreaded 1541 blues strike most people who have to sit around waiting for Commodore's large, grey plastic lump to reluctantly accept or part with a few bytes of information. By todays standards the drive is short on speed, reliability and capacity. It is long on bulk and price.

Why do they sell ? Because until recently, a bog standard 1541 was the only game in town unless you wanted to part with large amounts of cash and go for something like a 4040 dual drive and an add-on IEEE parallel interface.

The past months have seen a rash of hot-ups for the 1541 appear on the market. Better yet, alternative disk drives are also being released. Over the next issues of Australian Commodore Review, we will be looking at cures for the 1541 blues.This month, the SPEEDLOAD and 1541 EXPRESS cartridges come up for scrutiny.

SPEEDLOAD

SPEEDLOAD plugs into the cartridge port and signs on at power up by changing the D/rler to light green, the screen to green and the cursor to white. Readable, but not very tasteful.The cartridge can be toggled on and off by using a SYS64738 warm start.

Device eight, the disk drive, becomes the default number for LOADs and VERIFYs but not for SAVEs. Pressing SHIFT RUN/STOP produces a missing file name error. Cassette operation is restricted to SAVEing while SPEEDLOAD is enabled.

LOAD"$" will print a disk directory to the screen without wiping out the BASIC program currently in memory.

Speed

The cartridge increased loading speed for program files but not for sequential files as can be seen from the benchmark table. There is no improvement in the time taken to write information to a disk, so SAVEs and VERIFYs happen at normal speed. While LOADing, the video screen is blanked to get a bit more squirt from the 6510.

I had no problems loading BASIC and machine code programs from unprotected disks, however SPEEDLOAD came unstuck with commercial software using bad block copy protection. These included Asylum, Easy Script, KoalaPaint and The Manager database. Disabling the cartridge with a SYS64738 allowed the above programs to load, bar EasyScript.

Unlike the 1541 EXPRESS, SPEEDLOAD did not affect the normal operation of the serial bus, allowing a printer to be used in conjunction with the cartridge.

Documentation

The instructions for SPEEDLOAD were lost underfoot somewhere in the vastness of the editor's office. He informs me they comprised a sheet of paper with not much more than a copyright notice on it.

Usefulness

If you don't use commercial software or the cartridge port very much and get frustrated with the 1541's lack of pace then SPEEDLOAD would be worth shelling out $59.95 for. Bear in mind that software routines which speed up the 1541 are starting to appear inthe public domain. For my money, I would look for a more thorough solution to the 1541 blues.

1541 EXPRESS

Installing the 1541 EXPRESS re - quires opening the case on the 64. This voids the warranty, so if you have a' brand new computer it is worthwhile waiting 90 days before considering buying this unit.

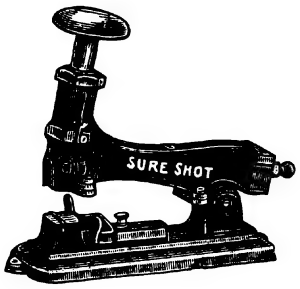
The unit comprises a cartridge which slots into the cartridge port (how about that) and two wires marked U14 PIN 15 and 6510 PIN 28. The wires hook up to the respective chips via clip on jumper leads. Don't be put off by having to open the case - installation is a five minute chore at most.

When the computer is switched on the cold start message has "WITH 1541 EXPRESS" tacked on underneath it. Besides speeding up the drive's opeation the cartridge adds the following features.

Device eight becomes the default for SAVEs, VERIFYs and LOADs, however the cassette can still be used by adding a ",1" to the required I/O command. Pressing a SHIFTed RUN/STOP is equivalent to typing LOAD"*",8 - i.e. the first program on the disk will be loaded and RUN. Sprites can be displayed on the screen while the disk drive is operating.

Unfortunately, disk directories load into BASIC program space instead of being printed to the screen. Oh well.

The 1541 EXPRESS has two modes of operation - normal 1541 speed and fast. Fast is turned on by pressing CTRL and the F1 key, pressing CTRL and the F3 key switches back to normal speed.



HARDWARE REVIEW

SCREEN PLAY
computer software

SCREEN PLAY, a new Adelaide based computer software house now presents two new programs for your Commodore 64.

These programs are: CAER SHIRAZ- an arcade adventure. Can you outwit the greedy Trader in an effort to buy the protection you need to traverse the dungeon maze of CAER SHIRAZ.? Can you in fact survive in this electronically synthesised lair of many things nasty and evil.?Buy the game and find out.

Diskette: $22.00 including postage.

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A HELPING HAND:a tape containing four utilities to ease the burden of everyday programming.

SCREEN PRINTER- an easy to use screen dump for standard characters.

MERGE WEDGE - enables you to merge two Basic programs together with a renumbering option. Great for adding extra routins to your programs.

SCROLL LISTER - gives you the ability to scroll listings on the screen using the cursor controls.

CHARACTER GRID - a simple way to redesign characters.

Why spend time typing book or magazine listings when you can have all four of these utilities on "A HELPING HAND" for only $11 (including postage).

Send your orders to SCREEN PLAY 9 Greenwood Drive, St Agnes, SA 5097 or call (08) 265 5833

Please allow 14 days for delivery.

Why not go fast all the time, you ask? Fast mode has some constraints.

First off, the cartridge uses one of the disk buffers. This reduces the number of disk files allowed to be OPEN at once to one relative or two sequential files.If a program needs both disk buffers, it will have to be run in normal mode.

The other constraint applies to the serial bus. Only one serial device can be used in fast mode. Fair enough, except I discovered that the same applies to normal mode. Nothing short of switching off and pulling the cartridge out would allow the usual understanding between my printer and disk drive. If your printer hooks up via the user port then you won't have any trouble.

Speed

The cartridge speeds up LOADing, SAVEing, VERIFYing and sequential and relative file access. On average, reading information from a disk is sped up by 100% and writing to a disk by 60%. This is somewhat below the manufacturer's claims for the product, but a useful improvement nonetheless.

Compatibility

Asylum, Easy Script, The Manager and KoalaPaint all loaded and ran successfully in fast mode. The 1541 EXPRESS came into its own when using programs where a lot of disk access goes on - like the wordprocessor and database. I couldn't find a commercial program which wouldn't load in fast mode, but then I don't have a large supply.

Documentation

The instruction booklet for the 1541 EXPRESS was also lost to headquarters. Inefficient. Who said that?

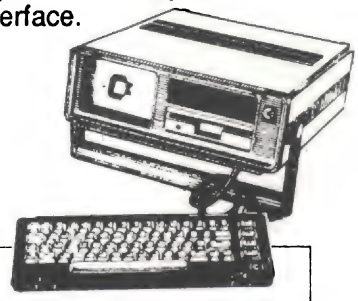
I am told by He Who Loses Things that the instruction booklet runs to eight pages in length and is nothing to write home - or in a computer magazine - about as far as quality and quantity of information goes.

Usefulness

If the 1541 EXPRESS let me use a printer on the serial bus and cost a bit less than $120 and came with better documentation, then I would say it was a definite Good Thing. However, it doesn't, so I can only rate it a partial Good Thing.

Summary

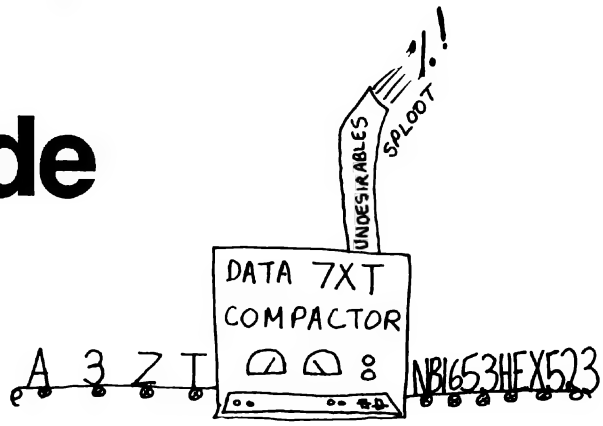
Neither of these packages cured my 1541 blues, although the 1541 EXPRESS came close. Next issue (hopefully) we will be looking at the 1541 FLASH! speeder upper, the SKAI 64 Commodore compatible disk drive and the double whammy, big bucks cure - a 4040 dual drive hooked up via a transparent IEEE parallel interface.



Speed Test Table

	STANDARD	SPEEDLOAD	1541 EXPRESS
LOAD 32K PROGRAM	81 SECS	27 SECS	38 SECS
SAVE 32K PROGRAM	93 SECS	93 SECS	68 SECS
READ 32K SEQUENTIAL FILE	124 SECS	124 SECS	76 SECS

Beginners' Guide to Disk Drives



by Stuart Kennedy

TIME: 2:00 AM. SITUATION: You have just finished debugging a 34K programming masterpiece which will even jolt the jaded eyeballs of someone who has seen it all - Andrew Farrell, boy magazine editor and software tycoon. ACTION: Save it on the good old cassette player. Rewind the tape, type SAVE"SPACE INVADERS V6000.15", press PLAY and RECORD and wait.

TIME: 2:15 AM. Hmm, better VERIFY that SAVE just in case. Rewind the type, type VERIFY"etc etc" and wait.

TIME: 2:30 AM. VERIFY ERROR flashes up on the screen. Rewind the tape and start again.

TIME: 9.15 AM. You wake to discover mostof a C64 keyboard imprinted on your cheek. Computers make terrible pillows. You are late for work/school and the screen is still reporting a VERIFY ERROR.

Your guardian angel appears. "My child," it says, "to protect your physical and mental health, it is time you bought a disk drive."

"But I'm dead broke and besides, they're pretty mysterious devices."

"Well, your dear uncle Ebenezer has just passed away, leaving you $500 and anyone who can write a program as momentous as SPACE INVADERS V6000.15 can surely work out the intricacies of a disk drive. If you need a bit of help buy the April issue of Australian Commodore Review and read A Beginners Guide To Disk Drives."

It departs in a blaze of light to take its place in the heavenly poker school.

Here you are. Read on.

Disk versus cassette

No contest. The only consideration here is price. $50 for the datasette versus $400-500 for the drive, depending on where you shop. Once you have used a disk drive, even a 1541, your cassette player will sit on the edge of the desk growing spiderwebs and mould.

The two main advantages in using a disk drive are data transfer speed and random access to files. "File" means either a program or data file.

The computer transfers information to and from the cassette player at 300 baud (baud = bits per second). This is SLOW. The 1541, slowest of the Commodore disk drives, transfers information at nearly 3300 baud - slow compared to other drives but a whole lot faster than cassette.

Random access is computer jargon for "if a piece of information exists, I can find it for you no matter where it physically exists."

With the cassette , it is up to you to keep a record of where a file exists via the tape counter. The fast forward and rewind buttons can then be used to manually position the read/write head at the start of the relevant file.

A disk drive does this record keeping for you by maintaining a directory of where files are stored. If there are ten programs on a particular disk, named prog1 to prog10, and you want to load the fifth one, type LOAD"prog5",8 and the disk drive will do the rest.

With a disk drive , it is possible to set up file types other than the simple sequential files used by the cassette. Relative files allow quick access to data in applications requiring a lot of permanently stored information - like databases.

BASIC and the DOS

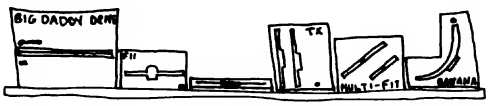
DOS stands for Disk Operating System, a program that controls the disk drive. With most computers, the DOS is loaded into memory at power up or comprises part of an operating system in ROM.

Commodore disk drives are unusual in that DOS resides in the disk drive rather than the computer. This is why they are called "intelligent" drives. The main advantage is that the DOS does not take up any of the computer's RAM, an important consideration with limited memory machines like the VIC20 and C16. Another plus is that to carry out a disk operation the computer need only send a disk command and the drive will take care of the rest. Since the computer does not have to run the DOS it is free to go on with other tasks.

How are disk commands sent to the drive? This depends on which machine you are using. The VIC20, C64 and SX64 have BASIC VERSION 2.0 which does not have disk related commands built in. The C16 and PLUS 4 use BASIC 3.5 which does have disk commands.

For those of us stuck with BASIC 2.0 the lack of disk keywords means a little extra typing when dealing with the drive.

For example, the disk command SCRATCH deletes a filename from the directory and frees the space taken up by the file. To SCRATCH a



One of these is actually a toaster.

file using BASIC 2.0 you type

OPEN15,8,15,"SCRATCH:THISFILE":CLOSE15

Channel 15 is special for two reasons. Firstly, it is the command channel over which commands are sent to the drive, secondly it is the channel the drive uses to report on any error condition occurring.

If there had been a problem with the SCRATCH operation, the red "in use" light on the drive would start to flash indicating an error. To find out which error, you have to enter a short BASIC program to read the error channel. Like this-

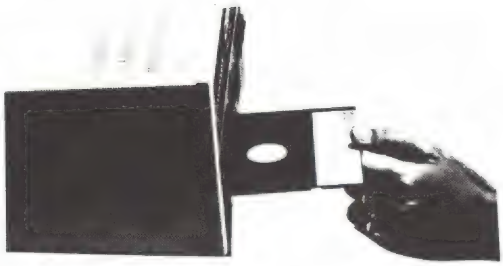
```
10CLOSE15:OPEN5,8,15
20INPUT#15,A$,B$,C$,D$
30PRINTA$,B$,C$,D$:CLOSE15
```

Did I say a little bit of extra typing?

With BASIC 3.5, typing SCRATCH "THISFILE" would automatically open channel 15, send the command, read the error channel if necessary and close the channel.

Feeding disk drives

The Commodore 1541, 2031 and 4040 disk drives feed on 5 1/4 inch, single sided, single density floppy diskettes which look like this.



Most disks these days are certified double density due to the number of double density drives in use. Don't worry, double density diskettes work fine in a single density drive.

Floppy disks consist of a disk of thin plastic coated with magnetically sensitive material enclosed in a protective cover.

Density refers to the amount of magnetically encoded information that can be crammed onto a diskette. Single density means up to 250K, double 500K and quadruple1000K per side.

Single sided means that only one side of the diskette is certified for use.

There is an old trick whereby a single sided disk is turned into a double sided one by cutting a write protect notch on the left edge of the disk with a paper punch. Don't make a habit of doing this as A) The flip side of a single sided disk is not factory guaranteed to be error free. B) By spinning the disk in the opposite direction to its normal rotation, dust and grit which has accumulated inside the disk jacket is wiped onto the "proper" side of the disk, eventually corrupting data. Disks like to be kept out of direct sunlight and away from magnetic fields. Keep them in their jackets when not in use and don't let coffee, greasy fingers or cigarette ash near

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PRIME NUMBERS – calculate prime numbers quickly.
PAINT SINGLE – 'fill in' landscapes quickly in single colour hi-res.
PAINT MULTI – 'fill in' landscapes in multi colour hi-res graphics.
WORD WRAP – wraps words around at the end of the line.

All of the above programs are supplied free with each purchase of G-Pascal on disk. G-Pascal is available from your local Commodore dealer, Commodore Information Centre Pty. Ltd., or Gambit Games. Recommended retail: $79.50

** excludes existing older dealer stocks.*

If you have already purchased G-Pascal these extra programs may be ordered by sending $20 direct to Gambit Games.

Gambit Games P.O. Box 124, Ivanhoe, Vic. 3079 Phone: (03) 497 1283.

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the read/write and timing holes cut into the disk cover.

Prices for a pack of ten disks range from around $50 for Verbatim Datalife disks in a plastic case with labels to $20 for Le Floppie by Imagineering which come in cellophane wrap without labels.

Which drive

The obvious choice for a VIC 20, C64, C16 or PLUS 4 owner is the Commodore 1541 drive. This drive provides 168K of formatted space per diskette and plugs in via the serial port.

Despite the fact the drive is comparatively slow and that some units suffer from reliability problems due to the read/write head going out of alignment, it does provide a far better file storage capability than tape. The official Commodore price for the 1541 is $499, although it is common to find them discounted to around $380.

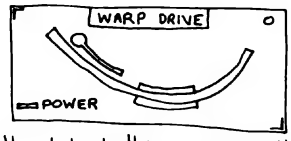
There are a number of other brand disk drives on the market, such as the SKAI 64 a.k.a. CX 500, which claim to be 100% Commodore compatible. Look for reviews of these in coming issues.

The alternative to using a one bit at a time serial drive is to buy an IEEE interface and use a one byte at a time parallel disk drive. IEEE (Institute of Electrical and Electromechanical Engineers) is a standard for parallel communication between a computer and its peripherals.

The Commodore 4040 dual drive and 2031 single drive are IEEE drives which are read compatible with the 1541. This means that disks created by each drive can be read by the other. Commodore claim that all three are write compatible as well - disks formatted on one drive can be written to by another - but there is some doubt that disks formatted on the 4040 or 2031 can be reliably written to by a 1541.

Commodore no longer manufacture the 4040, but they can still be found on the second hand market. The 2031 cost $396, but Commodore no longer has these in stock either.

If you need a lot of disk capacity, like 1000K, then the Commodore 1001 double sided drive may be the answer. It requires an IEEE interface and will not read or write to 1541 disks. Cost is around $630.



Its the latest thing, especially for bent disks...

Especially for beginners

WARM START Resetting the computer to the same condition as it is in after a cold start without actually turning off or on the power.
COLD START When you have just turned your computer on, you have carried out a cold start.
SYS 64738 This is the command we can use to produce a warm start from the keyboard.
CARTRIDGE A small piece of hardware containing either RAM or ROM to do a specific job that plugs into the expansion port.
RAM The work space inside the computer (Random Access Memory).
ROM This is where permanently stored programs inside the computer are kept (Read Only Memory).

Programmers Aid

Commodore 64 Basic has been probably been whinged about in 23 different languages.

There is nothing I can add to the worldwide whinge other than to say that the Basic is a very sparse way of working with a machine which cries out for experimentation by novice and expert programmer alike, due to its terrific graphic and sound chips.

But what about the exercise of programming itself?

Once again there is stuff all in the toolkit to make programming life easier and more efficient. Programming any-thing more hefty than a ten line piece of frippery is like doing an engine overhaul with a rusty shifting spanner and crowbar.

Enough waffle. The PROGRAMMERS AID from OZISOFT adds 17 commands to Basic which you will find useful in creating and debugging Basic code.

In detail

PROGRAMMERS AID loads into the 4K block of spare RAM at $C000 (49152 decimal).

Be warned that if you have any other routines sitting up there they will be overwritten.

It wedges into Basic via the "*" character. This means that all the commands must be preceded by "*". The com-mands are represented by single character mnemonics. A summary of the commands follows.

***AN**: Switches on auto line numbering. Simply type the line number you wish to start coding at, write the code for that line and when RETURN is pressed the next line will appear on the screen incremented by N. You switch it off by typing *A with no increment.

***BN**: Sets the screen border to colour N. No big deal but it beats typing POKE 53280,N.

***SN**: Sets the screen colour to colour N.

***R:** This command will switch the contents of all REM statements in a program to inverse video. This makes searching for subroutines in a properly REMarked program a breeze.

***DN/N:** Deletes a range of program lines starting at line N and finishing at /N.

***F"AA"**: Searches for a string of characters and lists the line numbers in which the specified string appears.

***W:** This command is for those of us who constantly forget that the 64 is limited to a program line of eighty char-acters. A warning bell rings when the cursor is on the 75th character position.

***N/N:** The first digit is the line number to begin renumbering at and the second is the increment to add to the next line number. This is a proper renumber utility in that G zVOS and GOSUBS are modified to correspond with the new line numbers. While the command is operating, dots are displayed on the screen representing the number of lines renumbered so far.If you have a fully debugged Basic program, a substantial speed increase can be had by renumbering with a start line of 0 and an increment of one, due to reduction of time Basic spends in scanning for following program lines.

***$**: Prints a disk directory to the screen without clobbering the Basic program currently in memory. AAAAH.

***C/N:** Opens the command channel 15, carries out a specified disk operation and closes the channel on completion. For example, *C/S:TRASHFILE will scratch TRASHFILE from the disk without you having to go through the usual OPEN15,8,15,"S:TRASHFILE":CLOSE15 rigmarole.

***E**: Reads the disk error channel and reports the error condition.

***O**: Resurrects Basic programs mur-dered by NEW or a SYS64738 cold start. Very handy.

***V:** This gives a listing of all simple numeric and string variables in order of declaration, by name and contents. It will not work on arrays. Great for finding the state of variables in a program section or trapping the common error of using a variable name twice.

***L/N**: My favourite. This command lists a program starting at line N. The program lines are indented one space to the right of the line number and spaced four lines apart. You can scroll up and down through the listing using the cursor keys. Turns reams of squashed together eye boggling code into neat, readable code. Pressing the RUN/STOP key returns control to the screen editor.

***KN/"A"**: The program scans the function keys which return the following strings when pressed - F1, LIST + RETURN; F2, GOTO; F3, RUN + RETURN; F4, GOSUB; F5, POKE; F6, RETURN; F7, PEEK; F8, INPUT.

***K** reassigns key number N to a string A of your choice. String length is limited to twenty characters.

***M"A",N**: Merges a program in memory with program file A loaded from device number N. After loading the new program segment the renumber com-mand is used to fix up the sequence of line numbers.

***T[1-10]:** Displays the program line number currently being executed in a window located on the top right corner of the screen. The window is six lines long, with the currently running line displayed at the bottom and scrolling up as the the next line comes into play. A number between one and ten determines the execution speed of the program - 10 is slowest, 1 is fastest.

***I**: Latches the interrupt driven func-tion key routine back in, if RUNSTOP/ RESTORE has been pressed.

***E:** Returns you to bog standard 64 Basic. Programmers Aid can be restarted with a SYS49152.

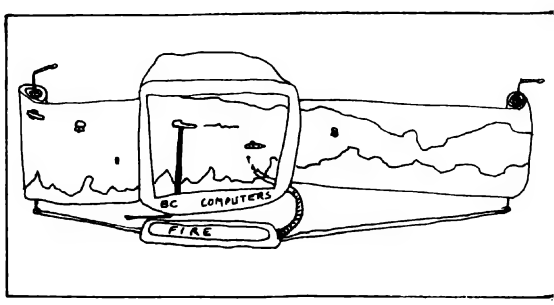
Documentation

The program comes with a 20 page manual which gives clear instructions on use of the commands. Each command is given a page to itself and there is a quick reference summary at the end of the booklet. While it's not a model of flash presentation, I liked its no nonsense approach.

Conclusion

Programmers Aid is a very useful toolkit for programming in straight 64 Basic. I now load it in as a matter of course before attacking the keyboard.

All the above utility commands can be found piecemeal as "free" listings in various computer rags. You are then left with the problem of typing, debugging and collating them into one package. For those of us not into keyboard mas-ochism, do yourself a favour and part with necessary $29.95 needed to score a copy of PROGRAMMERS.



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LETTERS

Letters

Public Domain Software

Through an advertisement in your magazine I purchased six disks from Public Domain Software House, P.O. Box 451, Spit Junction, NSW in October 1984.

I wrote to the firm in November 1984 stating four of the disks had faults and requesting exchange of disks. I received no reply. I wrote again in January 1985 requesting a reply by the 29th January. Still no reply.

I rely on magazines such as yours for reliable information, not only in articles but also in advertisements. I was pleased to note the Public Domain advertisement did not appear in your last edition. Should the advertisement appear again, I would find it necessary to cancel my subscription to your magazine.

Karma Hastwell, Kinglake, Vic.

***Editor:** We do try hard to make sure that our advertisers are reputable and responsible, and we are very sorry about your unfortunate experience. We also have tried to get in touch with Public Domain Software without success.*

Cutting a notch

I have purchased many single sided disks and have been told by some that by cutting another write protect notch opposite the one already there, I can double side my disk. Later I was told that as this makes the disk rotate in the opposite direction, this causes the dust collectors in the disk to spread dust over the disk.

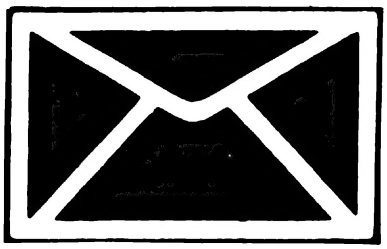
Is this true?

If it is, will it damage the disk drive or disks and is there any way of preventing this?

Julian Orbach, Blackwood, SA.

***Editor:** If you double side a disk soon after purchase, format and*

LETTERS



verify the reverse side, then all will probably be O.K.

However, do not double side disks that have already sustained heavy usage to the normal side. It should also be noted that most disk companies do not recom-mend the double siding of single sided disks as the magnetic coating on the reverse side is not tested for errors.

The dust problem has never been proven; perhaps that could be the topic of a future article.

Tuggerah Lakes CUG

May I introduce our new User Group and may I prevail upon you to inform your readers of these details:
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